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ABSTRACT

A list of twenty-six major categories of tasks to be accomplished by automotive mechanics students at the secondary level in industrial arts and/or trades and industry programs and at the postsecondary level in community college programs is provided. The twenty-six categories are as follow: accessories--air conditioning, accessories--heaters, chassis (electrical component servicing), starting system, charging system, battery, engine service (cooling system), engine tests, exhaust system, major engine service, minor engine service, valve train, power train (automatic transmission), clutch, drive line, final drive, standard transmission, brake service, steering, suspension, tune up (carburetion), ignition, emission control, fuel system, fuel injection, and evaluating and inspecting. Following this task list, which indicates the level and program at which the student should be able to accomplish the tasks, are three sections which list task objectives grouped in the program areas of industrial arts, trades and industry, and community college. Concluding the document is a checklist to record student task completion. Provided in the appendices are a one-page summary of the project conducted to develop this task list and a list of sources of instructional guides. (JH)

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AUTOMOTIVE MECHANICS ARTICULATION

A List of Tasks for Industrial Arts, Trades & Industry and Community College Instruction

June 1978

Project Number 78-805-13-03
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INTRODUCTION

The outcome of this effort is a list of educational experiences or tasks that automotive mechanics students should receive knowledge of and develop skills as the result of their schooling. Automotive mechanics instruction can be found in the secondary school level as an industrial arts program and/or trades and industry program and in the post-secondary level at the community college. An attempt was made to identify the level and program that a student should develop proficiency in these tasks. This would provide goals for programs and lead toward an articulated plan of automotive mechanics instruction which would minimize duplication and provide students with the most needed proficiencies.

Objectives are included to help instructors of any program develop their instructional activities. These objectives have been grouped together into the three program areas identified as industrial arts, trades and industry and community college.

A checklist for instructor and student use to record the tasks completed is intended to aid subsequent instructors as the students progress through programs at the secondary and post-secondary levels.

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RECOMMENDATIONS FOR USE OF THE PROJECT RESULTS

The Task List (pink) indicates by the Xs the level and program at which the student should be able to accomplish the tasks. In the case of the industrial arts and trades and industry, the year of the program is also indicated. The Task List should be used as a guide to help determine what knowledges and manipulative skills should be incorporated into the curriculum.

The objectives for each task are grouped according to the programs. For example, all the tasks indicated by an X for the industrial arts program have the objectives in the canary colored section. Thus the objectives will assist the industrial arts teacher to plan the activities and time required.

The lesson content, study assignments, and laboratory experiences can then be developed using textbooks and similar curriculum guides listed as Appendix B. These guides are excellent sources of lecture outlines, student study and classroom assignments, transparency masters, reviews and examinations, job sheets, and instructional resources and materials.

The Checklist of Tasks, russet (brown) in color, can be used by the instructor and student to monitor the progress of the student in the completion of the tasks. The checklist would be used as a basis for grading and also be a part of their record as the students progress from the first to second year of a program or from a secondary to post-secondary program of automotive mechanics instruction.

NUMBERING SYSTEM USED TO

LIST MAJOR TASK HEADINGS

1. Accessories - Air Conditioning
2. Accessories - Heaters
3. Chassis; Electrical Component Servicing
4. Starting System
5. Charging System
6. Battery
7. Engine Service - Cooling System
8. Engine Service - Engine Tests
9. Exhaust System
10. Major Service - Engine
11. Minor Service - Engine
12. Valve Train
13. Power Train - Automatic Transmission
14. Clutch
15. Drive Line
16. Final Drive
17. Standard Transmission
18. Brake Service
19. Steering
20. Suspension
21. Tune-Up - Carburetion
22. Ignition
23. Emission Control
24. Fuel System
25. Fuel Injection
26. Evaluating and Inspecting

AUTOMOTIVE ARTICULATION
LIST OF TASKS TO DEVELOP COMPETENCY

Task No.	Task or Job	Ind. Arts, 1st Year	Ind. Arts, 2nd Year	T & I, 1st Year	T & I, 2nd Year	Community College
1.0	*ACCESSORIES-AIR CONDITIONING*					
1.1	Connect manifold guage to system		X		X	X
1.2	Purge R-12 to atmosphere		X		X	X
1.3	Evacuate refrigeration system		X		X	X
1.4	Charge system using "pound" cans		X		X	X
1.5	Charge system using a bulk source		X		X	X
1.6	Perform leak test with halide torch		X		X	X
1.7	Perform leak test with electronic tester		X		X	X
1.8	Repair or replace refrigerant lines				X	X
1.9	Purge system					X
1.10	Remove and replace clutch and hub assembly				X	X
1.11	Remove and replace compressor gas shaft seal				X	X
1.12	Remove and replace compressor valve plates				X	X
1.13	Remove and replace compressors				X	X
1.14	Remove and replace thermostatic expansion valve				X	X
1.15	Remove and replace EPR (evaporative pressure absolute) valve				X	X
1.16	Remove and replace POA (pilot-operated absolute) valve				X	X
1.17	Remove and replace condenser				X	X
1.18	Performance-test system for temperatures		X		X	X
1.19	Diagnose refrigerant problems		X		X	X
1.20	Add oil under pressure		X		X	X

AUTOMOTIVE ARTICULATION

LIST OF TASKS TO DEVELOP COMPETENCY

Task No.	Task or Job	Ind. Arts, 1st Year	Ind. Arts, 2nd Year	T & I, 1st Year	T & I, 2nd Year	Community College
1.21	Overhaul compressor				X	X
1.22	Repair automatic air and heater vacuum and electrical circuits					X
1.23	Remove and replace fan motor					X
1.24	Remove and replace dryer					X
1.25	Service control cables and switches				X	
1.26	Identify pneumatic components and connections from schematics					X
1.27	Adjust compressor belt tension	X		X		X
1.28	Test vacuum components					X
1.29	Test mechanical-pneumatic controls					X
1.30	Test thermo-pneumatic controls					X
1.31	Remove and replace or repair pneumatic components					X
2.0	*ACCESSORIES HEATERS*					
2.1	Diagnose heating system malfunctions				X	X
2.2	Inspect, remove and replace defrost ducts				X	X
2.3	Inspect and replace control cables and switches					X
2.4	Inspect and replace heater hoses	X		X		X
2.5	Remove and replace heater control valve	X			X	X
2.6	Remove and replace heater core				X	X

AUTOMOTIVE ARTICULATION

LIST OF TASKS TO DEVELOP COMPETENCY

Task No.	Task or Job	Ind. Arts, 1st Year	Ind. Arts, 2nd Year	T & I, 1st Year	T & I, 2nd Year	Community College
3.0	*CHASSIS, ELECTRICAL COMPONENT SERVICE*					
3.1	Find schematic diagram for vehicles			X		X
3.2	Identify wire gauge and color code identification			X		X
3.3	Splice wires and connect terminals, solderless/solder			X		X
3.4	Isolate opens, grounds and shorts			X		X
3.5	Test, remove, and replace switches, circuit breakers and fuses	X		X		X
3.6	Perform operational inspection-lighting systems	X		X		
3.7	Test, remove, and replace lights, sockets and connections	X		X		X
3.8	Identify defective flasher units and replace	X		X		X
3.9	Test and repair turn-signal unit				X	X
3.10	Adjust headlights		X	X		X
3.11	Adjust, repair or replace back-up light switch			X		X
3.12	Test and repair horn circuit			X		X
3.13	Test and identify faulty instrument gauges and warning lamps			X		X
3.14	Remove and replace gauge and sending units (fuel, temperature, oil etc.)				X	X
3.15	Replace chassis wiring					X
3.16	Repair windshield wiper mechanisms or controls				X	X
3.17	Test blower motor for open and grounds			X		
3.18	Test, remove and replace cruise control units				X	X
3.19	Test wiper blades and arms	X		X		
3.20	Analyze cause of vehicle electrical fires			X		

AUTOMOTIVE ARTICULATION

LIST OF TASKS TO DEVELOP COMPETENCY

Task No.	Task or Job	Ind. Arts, 1st Year	Ind. Arts, 2nd Year	T & I, 1st Year	T & I, 2nd Year	Community College
3.21	Test, remove and replace stop light switch		X	X		
3.22	Test, repair automatic alarm systems of safety items (key, seat belts, etc.)				X	
4.0	*STARTING SYSTEM*					
4.1	Test starting system		X	X		X
4.2	Remove and replace solenoid		X	X		X
4.3	Remove and replace starter motor		X	X		X
4.4	Overhaul starter			X		X
4.5	Remove and replace ignition switch				X	X
5.0	*CHARGING SYSTEM*					
5.1	Remove and replace alternator belt	X		X		X
5.2	Test alternator output		X	X		X
5.3	Test voltage regulator		X	X		X
5.4	Remove and replace alternator		X	X		X
5.5	Remove and replace voltage regulator		X	X		X
5.6	Overhaul alternator			X		X
5.7	Test d.c. generator output		X	X		
5.8	Overhaul d.c. generator			X		

AUTOMOTIVE ARTICULATION

LIST OF TASKS TO DEVELOP COMPETENCY

Task No.	Task or Job	Ind. Arts, 1st Year	Ind. Arts. 2nd Year	T & I, 1st Year	T & I, 2nd Year	Community College
6.0	*BATTERY*					
6.1	Clean battery and cable connections	X		X		X
6.2	Check electrolyte level	X		X		X
6.3	Perform hydrometer test	X		X		X
6.4	Perform capacity (load) test		X	X		X
6.5	Perform charge test (3 minute charge)		X	X		X
6.6	Perform cell probe test			X		
6.7	Charge batteries	X		X		X
6.8	Service or replace battery box and hold down	X		X		
7.0	*ENGINE SERVICE-COOLING SYSTEM*					
7.1	Check liquid coolant level & restore amount	X		X		X
7.2	Check and replace all drive belts, coolant hoses, pulleys, & overflow tank	X		X		X
7.3	Check baffles & fins for restriction	X		X		X
7.4	Check exhaust leakage in cooling system			X		X
7.5	Remove & replace radiator & shroud			X		
7.6	Check & replace thermostat and housing.			X		X
7.7	Check & replace water pump				X	X
7.8	Check & replace core plugs (freeze plugs)				X	X
7.9	Check coolant freezing point	X		X		
7.10	Check coolant temperature	X		X		

AUTOMOTIVE ARTICULATION

LIST OF TASKS TO DEVELOP COMPETENCY

Task No.	Task or Job	Ind. Arts, 1st Year	Ind. Arts, 2nd Year	T & I, 1st Year	T & I, 2nd Year	Community College
7.11	Check and replace fan			X		X
7.12	Inspect and replace radiator hoses			X		
7.13	Replace fan clutch			X		X
7.14	Test & replace coolant pressure cap	X		X		X
7.15	Test thermostat operation			X		
7.16	Pressure test cooling system	X		X		X
8.0	*ENGINE SERVICE-ENGINE TESTS*					
8.1	Make wet & dry compression test		X	X		X
8.2	Diagnose coolant loss				X	X
8.3	Diagnose overheating problem					X
8.4	Diagnose fluid leaks		X			X
8.5	Diagnose vacuum leaks				X	X
8.6	Use cylinder leakage tester				X	
8.7	Diagnose mechanical engine noise				X	X
8.8	Diagnose exhaust leaks	X		X		X
8.9	Perform cylinder balance test				X	
9.0	*EXHAUST SYSTEM*					
9.1	Remove & replace or repair heat riser				X	X
9.2	Remove & replace exhaust manifold				X	X

AUTOMOTIVE ARTICULATION

LIST OF TASKS TO DEVELOP COMPETENCY

Task No.	Task or Job	Ind. Arts, 1st Year	Ind. Arts, 2nd Year	T & I, 1st Year	T & I, 2nd Year	Community College
9.3	Remove & replace mufflers, resonators, exhaust pipes, and extensions				X	X
9.4	Inspect for exhaust leaks	X		X		X
9.5	Check for exhaust restrictions	X			X	X
10.0	*MAJOR SERVICE*					
10.1	Remove & replace engine			X		X
10.2	Remove cylinder ridge			X		X
10.3	Remove & replace rods & pistons			X		X
10.4	Disassemble, inspect & reassemble piston/rod			X		X
10.5	Measure & service piston assembly			X		X
10.6	Remove, service & replace crankshaft and bearings			X		X
10.7	Remove & replace rear main oil seal				X	X
10.8	Measure cylinder bore			X		X
10.9	De-glaze cylinder			X		X
10.10	Remove & replace camshaft & lifters			X		X
10.11	Remove and replace camshaft bearings				X	X
10.12	Bore cylinder oversize				X	X
10.13	Inspect head for warp			X		X
10.14	Inspect block for warp			X		X
10.15	Measure crankshaft & camshaft journal size using micrometers			X		X
10.16	Remove & replace flywheel			X		X

AUTOMOTIVE ARTICULATION

LIST OF TASKS TO DEVELOP COMPETENCY

Task No.	Task or Job	Ind. Arts, 1st Year	Ind. Arts, 2nd Year	T & I, 1st Year	T & I, 2nd Year	Community College
10.17	Remove & replace flywheel ring gears				X	X
10.18	Replace gaskets and seals			X		
10.19	Remove & replace oil pan			X		X
10.20	Remove & replace timing gears			X		X
10.21	Remove & replace timing sprockets & chain			X		X
10.22	Clean engine parts & check for condition			X		
10.23	Measure rod to crank cheek clearance			X		X
10.24	Measure crank cheek to main thrust bearing clearance			X		X
10.25	Pressure test block for leaks				X	X
11.0	*MINOR SERVICE*					
11.1	Remove & replace motor mounts			X		X
11.2	Change oil & filter	X		X		X
11.3	Remove & replace valve cover gaskets			X		X
11.4	Adjust valves			X		X
11.5	Remove & replace intake manifold			X		X
11.6	Remove & replace timing gear cover & harmonic balancer			X		X
11.7	Remove & replace valve stem seals (with cylinder head installed)				X	X
11.8	Remove & replace oil pump				X	X
11.9	Perform operational inspection of lubricating system				X	
11.10	Inspect rear main oil seal for leaks		X		X	X

AUTOMOTIVE ARTICULATION

LIST OF TASKS TO DEVELOP COMPETENCY

Task No.	Task or Job	Ind. Arts, 1st Year	Ind. Arts, 2nd Year	T & I, 1st Year	T & I, 2nd Year	Community College
12.0	*VALVE TRAIN*					
12.1	Remove & replace cylinder heads (gasket)			X		X
12.2	Check & assemble cylinder heads			X		X
12.3	Reface valves & stem			X		X
12.4	Resurface valve seats			X		X
12.5	Check valve springs (tension & square)			X		X
12.6	Machine guides for special seals					X
12.7	Test, remove and replace cam followers					X
12.8	Check cylinder head for cracks				X	X
12.9	Determine valve guide to valve stem clearance				X	X
12.10	Recondition valve guides				X	X
13.0	*POWER TRAIN-AUTOMATIC TRANSMISSION*					
13.1	Check & add fluid to proper level	X		X		X
13.2	Change fluid and filter		X	X		X
13.3	Adjust throttle linkage				X	X
13.4	Adjust column or floor shift linkage				X	X
13.5	Adjust neutral safety switch				X	X
13.6	Adjust electrical kick-down switch				X	X
13.7	Remove & replace & check vacuum modulator				X	X
13.8	Remove & replace transmission or engine mounts				X	X

AUTOMOTIVE ARTICULATION

LIST OF TASKS TO DEVELOP COMPETENCY

Task No.	Task or Job	Ind. Arts, 1st Year	Ind. Arts, 2nd Year	T & I, 1st Year	T & I, 2nd Year	Community College
13.9	Adjust bands				X	X
13.10	Stall & oil pressure test transmission				X	X
13.11	Diagnose cooler problems				X	X
13.12	Clean cocler system				X	X
13.13	Repair minor leaks				X	X
13.14	Install auxiliary coolers				X	X
13.15	Remove & replace transmission				X	X
13.16	Remove & replace housing, bushing & seal				X	X
13.17	Remove & replace front pump seal & bushing				X	X
13.18	Assemble & disassemble transmission by units				X	X
13.19	Remove & replace bushings				X	X
13.20	Diagnose planetary gear assembly				X	X
13.21	Overhaul clutch assembly				X	X
13.22	Diagnose and repair governor				X	X
13.23	Diagnose & clean valve body				X	X
13.24	Diagnose & remove & replace overrunning sprag				X	X
13.25	Check converter removed from car				X	X
14.0	*CLUTCH*					
14.1	Adjust clutch pedal linkage		X	X		X
14.2	Road test & noise diagnoses				X	X

AUTOMOTIVE ARTICULATION

LIST OF TASKS TO DEVELOP COMPETENCY

Task No.	Task or Job	Ind. Arts, 1st Year	Ind. Arts, 2nd Year	T & I, 1st Year	T & I, 2nd Year	Community College
14.3	Replace clutch assembly and/or release bearing & fork				X	X
14.4	Replace pilot bearing				X	X
14.5	Check flywheel & housing runout and flatness				X	X
14.6	Inspection of parts				X	X
14.7	Repair hydraulic type clutch				X	X
15.0	*DRIVE LINE*					
15.1	Road test & diagnose drive line noise & vibrations				X	X
15.2	Remove & replace driveshaft assembly		X	X		X
15.3	Overhaul drive line assembly			X		X
15.4	Check drive line and pinion angle			X		X
15.5	Lubricate and service universal joints	X		X		X
15.6	Replace universal joints		X	X		X
15.7	Check drive line end-play and run-out			X		X
16.0	*FINAL DRIVE*					
16.1	Road test & diagnose final drive noise				X	X
16.2	Remove & replace rear axle				X	X
16.3	Remove & replace pinion seals				X	X
16.4	Inspect for proper lubricant type and level	X		X		X
16.5	Remove & replace final drive assembly				X	X

AUTOMOTIVE ARTICULATION

LIST OF TASKS TO DEVELOP COMPETENCY

Task No.	Task or Job	Ind. Arts, 1st Year	Ind. Arts, 2nd Year	T & I, 1st Year	T & I, 2nd Year	Community College
16.6	Overhaul carrier assembly				X	X
16.7	Inspect & repair 4 wheel drive locking hubs				X	X
16.8	Inspect 4 wheel drive mechanisms				X	X
16.9	Replace rear axle bearings & seal				X	X
17.0	*STANDARD TRANSMISSION*					
17.1	Inspect for proper lubricant type and level	X		X		X
17.2	Adjust shift linkage			X		X
17.3	Remove & replace transmission mounts			X		X
17.4	Road test car for noise diagnoses				X	X
17.5	Remove & replace extension housing seal and bushing			X		X
17.6	Remove & replace transmission			X		X
17.7	Overhaul 3 speed standard transmission			X		X
17.8	Inspection of internal parts			X		X
17.9	Remove & replace speedometer drive gear					X
17.10	Remove & replace input and output shaft bearings			X		X
18.0	*BRAKE SERVICE					
18.1	Diagnose brake system		X	X		X
18.2	Remove & replace brake lines & hose			X		X
18.3	Bleed hydraulic systems			X		X

AUTOMOTIVE ARTICULATION

LIST OF TASKS TO DEVELOP COMPETENCY

Task No.	Task or Job	Ind. Arts, 1st Year	Ind. Arts. 2nd Year	T & I, 1st Year	T & I, 2nd Year	Community College
18.4	Adjust parking brake		X	X		X
18.5	Remove & replace power brake booster			X		X
18.6	Remove & replace proportioning/metering valve			X		
18.7	Overhaul master cylinder (dual)			X		X
18.8	Reline drum type brakes		X	X		X
18.9	Cam grind brake shoes			X		X
18.10	Inspect, measure & turn brake drums			X		X
18.11	Remove, replace & overhaul wheel cylinders			X		X
18.12	Adjust drum brakes		X	X		X
18.13	Reline disc-type brakes		X	X		X
18.14	Inspect, measure and reface disc brake rotors			X		X
18.15	Remove, replace & overhaul calipers			X		X
18.16	Recondition backing plates			X		X
19.0	*STEERING*					
19.1	Diagnose steering problems				X	X
19.2	Remove & replace power steering lines			X		X
19.3	Remove & replace power steering pump				X	X
19.4	Remove & replace manual steering gear assembly			X	X	X
19.5	Remove & replace power steering gear assembly				X	X
19.6	Remove & replace steering wheel			X		X

AUTOMOTIVE ARTICULATION

LIST OF TASKS TO DEVELOP COMPETENCY

Task No.	Task or Job	Ind. Arts, 1st Year	Ind. Arts. 2nd Year	T & I, 1st Year	T & I, 2nd Year	Community College
19.7	Remove & replace rod end, center link, and idler arm				X	X
19.8	Overhaul manual steering gear assembly				X	X
19.9	Overhaul power steering unit				X	X
19.10	Remove and replace power steering pump					X
19.11	Overhaul power steering pump				X	X
19.12	Adjust worm and sector in steering box				X	X
19.13	Lubricate steering box and linkage			X		
19.14	Rebuild power steering cylinder				X	
19.15	Inspect & replace steering damper				X	X
19.16	Overhaul Rack & Pinion Power Steering unit				X	
19.17	Replace or overhaul McPherson Struts				X	
	SUSPENSION					
20.1	Rotate tires	X		X		X
20.2	Balance tires	X		X		X
20.3	Lubricate front suspension	X		X		X
20.4	Diagnose wear & alignment problems	X		X		X
20.5	Remove, replace, clean, repack, & adjust front wheel bearings and seals	X		X		X
20.6	Align front end			X		X
20.7	Remove & replace shock absorbers		X	X		X
20.8	Remove & replace coil springs				X	X

AUTOMOTIVE ARTICULATION

LIST OF TASKS TO DEVELOP COMPETENCY

Task No.	Task or Job	Ind. Arts, 1st Year	Ind. Arts, 2nd Year	T & I, 1st Year	T & I, 2nd Year	Community College
20.9	Remove & replace torsion bar				X	X
20.10	Remove & replace leaf spring shackles				X	X
20.11	Remove & replace upper & lower control arms				X	X
20.12	Remove & replace ball joints				X	X
20.13	Remove & replace stabilizers, sway bar, strut bar, and bushings				X	X
20.14	Remove & replace king pins				X	X
20.15	Inspect tires and wheels	X		X		X
21.0	*TUNE-UP - CARBURETION*					
21.1	Test & repair heated air intake systems		X	X		X
21.2	Test & replace manifold heat control valve		X		X	X
21.3	Check & replace temperature sensor		X	X		X
21.4	Test & repair automatic choke		X		X	X
21.5	Remove, replace & overhaul carburetor			X		X
21.6	Test, repair, & adjust carburetor controls				X	X
21.7	Adjust air screws on carburetor & idle RPM		X	X		X
21.8	Test & replace the hot idle compensator valve				X	X
21.9	Test carbon monoxide and hydrocarbons with infra-red analyzer			X		X
21.10	Adjust carburetor idle mixture with tachometer	X		X		X
21.11	Adjust carburetor idle mixture (CO) with infra-red analyzer			X		X

AUTOMOTIVE ARTICULATION

LIST OF TASKS TO DEVELOP COMPETENCY

Task No.	Task or Job	Ind. Arts, 1st Year	Ind. Arts, 2nd Year	T & I, 1st Year	T & I, 2nd Year	Community College
22.0	*IGNITION*					
22.1	Test engine on scope & accurately report reading of test patterns				X	X
22.2	Test & repair/replace ignition primary circuit including points, condensor, coil, wiring, and ign, switch	X			X	X
22.3	Test & recondition or replace the parts of the secondary circuit of the ignition system	X			X	X
22.4	Remove & replace distributor		X	X		X
22.5	Overhaul distributor			X		X
22.6	Test, repair, adjust distributor control			X		X
22.7	Test and/or replace automatic spark advance		X	X		X
22.8	Clean, gap, test spark plugs	X		X		X
22.9	Measure resistance in plug wires	X		X		X
22.10	Locate & repair shorts and opens		X	X		X
23.0	*EMISSION CONTROLS*					
23.1	Check PCV valve system	X		X		X
23.2	Test & repair the air injection reaction type system				X	X
23.3	Test & repair exhaust gas recirculation systems				X	X
23.4	Test & repair ignition spark control exhaust emission systems				X	X
24.0	*FUEL SYSTEM*					
24.1	Check and/or replace fuel air filters	X		X		X
24.2	Test & replace fuel lines and hoses	X		X		X

AUTOMOTIVE ARTICULATION

LIST OF TASKS TO DEVELOP COMPETENCY

Task No.	Task or Job	Ind. Arts, 1st Year	Ind. Arts, 2nd Year	T & I, 1st Year	T & I, 2nd Year	Community College
24.3	Test & replace fuel pump			X		X
24.4	Test & repair evaporative emission control systems				X	X
24.5	Check for moisture & foreign particles				X	
24.6	Inspect and service gas tank and cap				X	
25.0	*FUEL INJECTION*					
25.1	Analyze problems by electrical diagnostic equipment					X
25.2	Repair or replace electrical fuel injection computer					X
25.3	Repair or replace fuel injectors					X
25.4	Repair or replace fuel injector pumps					X
25.5	Repair or replace wiring harness					X
26.0	*EVALUATING AND INSPECTING*					
26.1	Analyze causes of vehicle failures		X			X
26.2	Conduct spot checks on malfunctions		X			X
26.3	Estimate cost of vehicle repairs		X			X
26.4	Inspect & test windshield wiper motors, blades & arms	X				X
26.5	Perform inspection of vehicle condition	X				X
26.6	Identification & usage of basic hand tools	X				
26.7	Shop safety	X				

1.0 TASK GROUP: ACCESSORIES-AIR CONDITIONING

TASK GOAL: Given any vehicle with a malfunctioning air conditioning system, the student will be able to diagnose and correct any malfunction encountered so that the system operates to manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools, and equipment, the student will obtain the following competencies:

TASK NUMBER:

1.1 Connect manifold gauges to system

Given one air conditioned vehicle, the student will connect the gauge set (high and compound) to the refrigeration system with the compound gauge on the suction line and the high pressure gauge on the discharge line.

1.2 Purge R-12 to atmosphere

Given one air conditioned vehicle and manifold gauge set, the student will purge system R-12 to the atmosphere and to the pressure of 0 p.s.i.g.

1.3 Evacuate refrigeration system

Given one air conditioned vehicle and manifold gauge set and evacuation pump, the student will evacuate all vehicle air conditioning systems to 1500 microns p.s.i.a. and maintain the pressure under evacuation for one-half hour.

1.4 Charge system using "pound" cans

Given one air conditioned vehicle and pound cans of R-12, the student will charge one vehicle refrigeration system through the low (suction) side according to industry practices and accepted safety standards.

1.5 Charge system using a bulk source

Given one air conditioned vehicle and a bulk source of R-12 (5-50 lbs drum), the student will measure and charge the vehicle refrigeration system with R-12 to the specified charge.

ACCESSORIES-AIR CONDITIONING (Cont.)

1.6 Perform leak test with halide torch

Given one air conditioned vehicle and a halide torch, the student will leak test the vehicle air conditioner and determine the source of any existing leaks.

1.7 Perform leak test with electronic tester

Given one vehicle and an electronic type tester, the student will leak test the vehicle air conditioner and determine the source of any existing leaks.

1.18 Performance test system for temperatures

Given one air conditioned vehicle the student will make a performance test on the vehicle air conditioner determining temperature level and pressures according to manufacturers' outlined procedure.

1.19 Diagnose refrigerant problems

Given one air conditioned vehicle, the student will diagnose and make correct recommendations for repair.

1.20 Add oil under pressure

Given one air conditioned vehicle, the student will add refrigeration oil to the charged system without leakage.

1.27 Adjust compressor belt tension

Given one air conditioned vehicle, the student will adjust the belt tension to manufacturers' specifications.

2.0 TASK GROUP: ACCESSORIES-HEATERS

TASK GOAL: Given any vehicle with a malfunctioning heater, the student will be able to diagnose and repair any malfunction encountered so that the heater operates to manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

2.4 Inspect and replace heater hoses

Given one vehicle heater system and switch, the student will inspect and replace heater hoses as needed without damage to heater component or leaks after installation.

2.5 Remove and replace heater control valves

Given a vehicle, the student will remove and replace heater control valves without damage or leakage to the system.

3.0 TASK GROUP: CHASSIS, ELECTRICAL COMPONENT SERVICE

TASK GOAL: Given any vehicle with trouble in any of the electrical components, the student will be able to diagnose and repair the trouble where the vehicle's electrical system will operate to manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

3.5 Test, remove, and replace switches, circuit breakers and fuses

Given one vehicle, the student will test, remove, and replace defective switches, circuit breakers, and fuses on the vehicle to restore normal operation of the affected circuits without damage to additional components.

3.6 Perform operational inspection of lighting systems

Given one vehicle, the student will perform operational inspection on the lighting systems according to manufacturers' procedures.

3.7 Test, remove, and replace light, sockets, and connections

Given one vehicle, the student will determine the condition and repair the lights, sockets, and connections on the vehicle's lighting system to restore normal operation.

3.8 Identify defective flasher units and replace

Given one vehicle, the student will identify and replace flasher units so all directional signals and emergency flashers will function properly.

3.10 Adjust headlights

Given one vehicle, the student will adjust the vehicle's headlights to the state inspection standards.

3.19 Test wiper blades and arms

Given a vehicle, the student will identify and correct any problem with wiper blades and arms.

3.21 Test, remove and replace stop light switch

Given a vehicle, the student will test, remove and replace the stop light switch.

4.0 TASK GROUP: STARTING SYSTEM

TASK GOAL: After completion of this module, the student will be able to diagnose and repair any trouble in any section of the starting system and the vehicle will start every time attempted.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

4.1 Test starting system

Given one vehicle, the student will test the starting system and its component parts, isolating the cause or failure and make recommendations for repair.

4.2 Remove and replace solenoid

Given one vehicle, the student will remove and replace the solenoid without damage to solenoid and be able to start the vehicle after installation.

4.3 Remove and replace starter motor

Given one vehicle, the student will be able to remove and replace the starter motor so that it operates properly with proper alignment and no dragging.

5.0 TASK GROUP: CHARGING SYSTEM

TASK GOAL: The student will be able to diagnose and repair troubles with a charging system so that the system will perform to manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

5.1 Remove and replace alternator belt

Given an alternator-equipped vehicle, the student will be able to remove, replace, and tighten alternator belt to proper belt tension.

5.2 Test alternator output

Given one (1) vehicle, the student will test alternator output according to manufacturers' specifications without damaging equipment or alternator.

5.3 Test voltage regulator

Given one (1) vehicle, the student will hook-up and test the condition of the voltage regulator without damage to equipment or regulator.

5.4 Remove and replace alternator

Given an alternator-equipped vehicle, the student will remove and replace the vehicle alternator without damage and it will operate properly.

5.5 Remove and replace voltage regulator

Given one (1) vehicle with external voltage regulator, the student will remove and replace the voltage regulator and it will operate correctly.

5.7 Test d.c. generator output

Given one (1) vehicle, the student will test generator output according to manufacturers' specifications without damaging equipment or alternator.

6.0 TASK GROUP: BATTERY

TASK GOAL: The student will be able to diagnose and repair or replace battery system malfunctions and the vehicle will start each time tried and the battery will stay charged.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

6.1 Clean battery and cables connections

Given one vehicle, terminal removers, cleaning materials, and instructions, the student will remove, clean, and replace battery case, posts, and cables without damage to the battery so that the vehicle will start each time.

6.2 Check electrolyte level

Given one battery, distilled water, and manufacturers' specifications, the student will check the electrolyte level and fill to proper level.

6.3 Perform hydrometer test

Given one battery and a hydrometer, the student will measure and record the specific gravity of each battery cell within an accuracy of five points (0.005).

6.4 Perform capacity load test

Given one battery, the student will perform a capacity (load) test and determine the serviceability or need for further testing of the battery.

6.5 Perform charge test (3 minute charge)

Given three (3) batteries, a battery charger, and voltmeter, the student will determine if the battery is sulfated or if it can be returned to service.

6.7 Charge batteries

Given one hydrometer and battery charger, the student will correctly determine the state of charge and charge the battery at the correct rate and amount of time necessary to bring the battery to full charge.

BATTERY (Cont.)

6.8 Service or replace bettery box and hold down

Given one (1) vehicle, the student will be able to service or replace battery box and hold down and the battery will be secure when completed.

7.0 TASK GROUP: ENGINE SERVICE-COOLING SYSTEM

TASK GOAL: The student will be able to diagnose and repair cooling system problems and the vehicle will not heat or leak under normal driving conditions.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

7.1 Check liquid coolant level and restore amount

Given one (1) vehicle, the student will determine the amount of contaminants and restore system condition to manufacturers' specifications.

7.2 Check and replace all drive belts, coolant hoses, pulleys and overflow tanks

Given one (1) vehicle, the student will check and replace, as necessary, the drive belts, coolant hoses, pulleys, and overflow tank to meet manufacturers' specifications.

7.3 Check baffles and fins for restriction

Given one (1) vehicle, the student will check the baffles and fins of a radiator for restriction and clean, as necessary, to the satisfaction of the instructor.

7.9 Check coolant freezing point

Given one (1) vehicle and proper equipment, the student will be able to determine coolant freezing point.

7.10 Check coolant temperature

Given one (1) vehicle and proper equipment, the student will be able to measure coolant temperature.

7.14 Test and replace coolant pressure cap

Given both short and long neck radiators, the student will pressure test both caps and determine the condition of the caps.

7.16 Pressure test cooling system

Given a vehicle, the student will check a cooling system with a pressure tester and find all external leaks.

8.0 TASK GROUP: ENGINE SERVICE - ENGINE TESTS

TASK GOAL: After completion of this module, the student will be able to diagnose problems of compression, coolant loss, overheating, fluid leaks, vacuum leaks, engine noises, or exhaust leaks and make correct recommendations for repair.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

8.1 Make wet and dry compression test

Given one (1) vehicle with compression problems, the student will make a wet and dry compression test to determine the cause of compression loss to the satisfaction of the instructor.

8.4 Diagnose fluid leaks

Given samples, the student will identify engine oil, automatic transmission fluid, gear oil, and antifreeze.

8.8 Diagnose exhaust leaks

Given one (1) vehicle with exhaust leaks, the student will determine the location and necessary repairs to the satisfaction of the instructor.

9.0 TASK GROUP: EXHAUST SYSTEM

TASK GOAL: After completion of this module, the student will be able to diagnose and repair exhaust system problems without leaks or rattles when completed.

Given safety procedures, service manuals, manufacturers' specifications, proper tools, and equipment, the student will obtain the following competencies:

TASK NUMBER:

9.4 Inspect for exhaust leaks

Given a vehicle, the student will visually trace exhaust system and inspect for leaks.

9.5 Check for exhaust restrictions

Given a vehicle, the student will visually trace the exhaust systems and inspect for restrictions and/or use a vacuum gauge to check for restrictions.

11.0 TASK GROUP: ENGINE SERVICE - MINOR SERVICE

TASK GOAL: After completion of this module, the student will be able to change oil and filter and check for oil leaks; the vehicle will perform satisfactorily when each is completed.

Given safety procedures, service manuals, manufacturers' specifications, proper tools, and equipment, the student will obtain the following competencies:

TASK NUMBER:

11.2 Change oil and filter

Given any late engine, the student will change the oil and filter without damage to related parts or oil leakage and all attachments will operate normally.

11.10 Inspect rear main oil seal for leaks

Given a vehicle, the student will visually inspect for rear main oil seal leaks.

13.0 TASK GROUP: POWER TRAIN - AUTOMATIC TRANSMISSION

TASK GOAL: After completion of this module, the student will be able to maintain an automatic transmission so that it shifts at the correct speed and does not leak.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

13.1 Check and add fluid to proper level

Given one (1) vehicle and fluid, the student will bring the fluid to proper level according to manufacturers' specifications.

13.2 Change fluid and filter

Given one (1) vehicle, fluid, filter and gaskets, the student will change fluid and filter; the vehicle will shift properly and not leak.

14.0 TASK GROUP: POWER TRAIN - CLUTCH

TASK GOAL: After completion of this module, the student will be able to adjust a clutch to meet manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

14.1 Adjust clutch pedal linkage

Given a vehicle, the student will adjust the pedal linkage to an accuracy of 1/16 inch.

15.0 TASK GROUP: POWER TRAIN - DRIVE LINE

TASK GOAL: After completion of this module, the student will be able to diagnose and repair drive line problems encountered to meet manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

15.2 Remove and replace drive shaft assembly

Given one (1) vehicle, the student will remove and replace drive shaft assembly and align properly; the drive line will not vibrate when work is completed.

15.5 Lubricate and service U-joints

Given one (1) vehicle, the student will lubricate and service U-joints.

15.6 Replace Universal joints

Given one (1) vehicle, the student will remove and replace the U-joints. The drive line will operate properly upon completion.

16.0 TASK GROUP: POWER TRAIN - FINAL DRIVE

TASK GOAL: After completion of this module, the student will be able to replace lubricant in the final drive without leakage when work is completed.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

16.4 Inspect for proper lubricant type and level

Given one (1) vehicle, the student will check for proper lubricant level, type, and change or add according to manufacturers' specifications.

17.0 TASK GROUP: POWER TRAIN - STANDARD TRANSMISSION

TASK GOAL: After completion of this module, the student will be able to add lubricant to the standard transmission.

Given safety procedures, service manuals, manufacturers' specifications, proper tools, and equipment, the student will obtain the following competencies:

TASK NUMBER:

17.1 Inspect for proper lubricant type and level

Given one (1) vehicle with standard transmission, the student will check lubricant for proper level and will inspect fluid for metal fragments; then the student will fill or change the fluid in accordance to manufacturers' specifications.

18.0 TASK GROUP: CHASSIS - BRAKE SERVICE

TASK GOAL: After completion of this module, the student will be able to diagnose and repair brake defects and when the job is completed, the vehicle will stop in the prescribed stopping distance and will not pull the vehicle from side to side.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

18.1 Diagnose brake system

Given one (1) vehicle, the student will test the brake system for pedal height and brake hardness according to manufacturers' specifications; the student will pull left front wheel to check for lining wear and drum condition and identify existing condition.

18.4 Adjust parking brake

Given one (1) vehicle, the student will adjust and service the parking brakes to hold the car from rolling when the emergency brake is applied.

18.8 Reline drum type brakes

Given one (1) vehicle with drum type brakes, the student will remove and replace worn brake lining on each without pulling and with proper pedal height.

18.12 Adjust drum brakes

Given one (1) vehicle from different manufacturers, the student will adjust brakes on in-service automobiles to the pedal height as specified by the manufacturer.

18.13 Reline disc-type brakes

Given one (1) vehicle, the student will remove and replace worn disc brake linings without pulling or fading when completed.

20.0 TASK GROUP: CHASSIS - SUSPENSION

TASK GOAL: After completion of this module, the student will be able to diagnose suspension or alignment problems and the vehicle will not squeak, vibrate, sag, or pull from side to side while driving after being completed.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

20.1 Rotate tires

Given one (1) vehicle, the student will rotate the tires using manufacturers' recommendations.

20.2 Balance tires

Given one vehicle, the student will balance the tires using a bubble balancer on two so that all tires will be balanced within an accuracy of 1/4 oz.

20.3 Lubricate front suspension

Given one (1) vehicle, the student will properly lubricate the front suspension without overlooking any grease fittings and following the vehicle manufacturers' recommendations.

20.4 Diagnose wear and alignment problems

Given one (1) vehicle, the student will inspect and diagnose the front suspension and determine and record what problems exist.

20.5 Remove, replace, clean, repack, and adjust front wheel bearings and seals

Given one (1) vehicle, the student will remove four wheel bearings, clean, inspect, and replace, as needed, worn bearings, repack and adjust to factory specified tightness.

20.7 Remove and replace shock absorbers

Given one (1) vehicle, the student will remove and replace front and rear shocks without rattles or looseness.

20.15 Inspect tires and wheels

Given one vehicle, the student will inspect tires and wheels for hazardous conditions and serviceability.

21.0 TASK GROUP: CARBURETOR

TASK GOAL: After completion of this module, the student will be able to diagnose and repair carburetor problems to meet manufacturers' and EPA specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

21.1 Test and repair heated air intake system

Given one (1) vehicle with vacuum motor or with capsule control sensory device and engine analyzer or vacuum gauge, the student will test and repair heated carburetor air systems in accordance with manufacturers' specifications.

21.2 Test and replace the manifold heat control valve

Given one (1) vehicle and necessary parts, the student will check and replace the heat control valve or vacuum motor and sensor so that they operate without leakage.

21.3 Check and replace temperature sensor

Given one (1) vehicle and temperature gauge or lights, the student will check or replace the sensor (sender) so that the gauge or lights operate.

21.4 Test and repair automatic choke

Given one (1) type of automatic choke, piston type or diaphragm type, the student will test and repair or adjust automatic choke to manufacturers' specifications.

21.7 Adjust air screws on carburetor and idle RPM

Given one (1) vehicle with carburetor equipped with a closed throttle and air screws to adjust, the student will adjust the air screws and idle RPM to manufacturers' specifications.

21.10 Adjust carburetor idle mixture with tachometer

Given one (1) vehicle, the student will properly adjust idle air-fuel mixture with a tachometer and the engine will idle smoothly.

22.0 TASK GROUP: IGNITION

TASK GOAL: After completion of this module, the student will be able to diagnose and repair ignition problems to meet manufacturers' standards.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

22.2 Test and repair or replace the ignition primary circuit including points, condensor, coil, wiring, and ignition switch.

Given a domestic automobile, the student will be able to accurately test and replace or repair any part of the primary ignition circuit to the satisfaction of the instructor.

22.3 Test and recondition or replace the parts of the secondary circuit of the ignition system

Given a domestic automobile, the student will be able to accurately test the secondary circuit of the ignition system and replace any defective parts; the secondary circuit will be in correct operation when completed.

22.4 Remove and replace distributor

Given one (1) vehicle, the student will remove and replace an ignition distributor so that the distributor is timed in such a manner that the vehicle will start and run.

22.7 Test and/or replace automatic (mechanical) spark advance

Given one (1) vehicle, the student will test the automatic spark advance system and replace components as necessary; the vehicle spark advance mechanism will perform to manufacturers' specifications when completed.

22.8 Clean, gap, test spark plugs

Given one (1) spark plug, student will clean, gap and test plugs to meet equipment manufacturers' specifications.

22.9 Measure resistance in plug wire

Given one (1) spark plug wire, the student will measure resistance to determine serviceability.

22.10 Locate and repair shorts and opens

Given a vehicle, the student will locate and repair shorts and opens in the primary ignition circuit.

23.0 TASK GROUP: EMISSION CONTROLS

TASK GOAL: After completion of this module, the student will repair, replace, or adjust emission control components on a vehicle to comply with specifications on emission levels accepted by government agencies.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

23.1 Check PCV valve system

Given one (1) vehicle, the student will be able to diagnose and repair defective PCV valve system on domestic automobiles.

24.0 TASK GROUP: FUEL SYSTEM

TASK GOAL: After completion of this module, the student will be able to diagnose and repair fuel system problems to meet manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

24.1 Check and/or replace fuel and air filters

Given one (1) vehicle, the student will check and/or replace the fuel and air filters properly and without leaks.

24.2 Test and replace fuel lines and hoses

Given two (2) vehicles and parts, the student will test and replace fuel lines so there is no leakage.

26.0 TASK GROUP: EVALUATING AND INSPECTING

TASK GOAL: After completion of this module, the student will be able to inspect and evaluate the safety condition of a vehicle and estimate repair costs.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

26.1 Analyze cause of vehicle failures

Given a vehicle and procedures, the student will analyze causes of vehicle failure.

26.2 Conduct spot checks on malfunctions

Given a vehicle and procedures, the student will conduct a spot check on malfunctions.

26.3 Estimate cost of vehicle repair

Given a parts and flat rate manual, the student will be able to estimate cost of vehicle repairs.

26.4 Inspect and test windshield wiper motors, blocks and arms

Given a vehicle, a student will inspect and test windshield wiper motors, blocks and arms.

26.5 Perform inspection of vehicle condition

Given a vehicle and check list, the student will perform inspection of vehicle condition and determine safety and condition of the vehicle.

26.6 Identification and use of basic hand tools

Given basic hand tools, the student will correctly identify and demonstrate proper usage.

26.7 Shop safety

Given instruction in shop safety, the student will demonstrate safe work procedures and habits while working in the laboratory.

1.0 TASK GROUP: ACCESSORIES-AIR CONDITIONING

TASK GOAL: Given any vehicle with a malfunctioning air conditioning system, the student will be able to diagnose and correct any malfunction encountered so that the system operates to manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools, and equipment, the student will obtain the following competencies:

TASK NUMBER:

1.1 Connect manifold gauges to system

Given two (2) air conditioned vehicles, the student will connect the gauge set (high and compound) to the refrigeration system with the compound gauge on the suction line and the high pressure gauge on the discharge line correctly on each attempt.

1.2 Purge R-12 to atmosphere

Given two (2) air conditioned vehicles and manifold gauge set, the student will purge system R-12 to the atmosphere to 0 p.s.i.g.

1.3 Evacuate refrigeration system

Given two (2) air conditioned vehicles and manifold gauge set and evacuation pump, the student will evacuate all vehicle air conditioning systems to 1500 microns p.s.i.a. and maintain the pressure under evacuation for one-half hour.

1.4 Charge system using "pound" cans

Given four (4) air conditioned vehicles and pound cans of R-12, the student will charge four vehicle refrigeration systems through the low (suction) side according to industry practice and accepted safety standards 100% of the time.

1.5 Charge system using a bulk source

Given two (2) air conditioned vehicles from different manufacturers and a bulk source of R-12 (5-30 lb. drum), the student will measure and charge all vehicle refrigeration systems with R-12 to specified charge.

ACCESSORIES-AIR CONDITIONING (Cont.)

1.6 Perform leak test with halide torch

Given three (3) air conditioned vehicles from different manufacturers and a halide torch, the student will leak test the vehicle air conditioners and determine the source of any existing leaks.

1.7 Perform leak test with electronic tester

Given three (3) vehicles from different manufacturers and an electronic type tester, the student will leak test the vehicle air conditioners and determine the source of any existing leaks.

1.8 Repair or replace refrigerant lines and line connectors

Given two (2) air conditioned vehicles, the student will repair refrigerant line either by flaring copper tubing, flaring aluminum tubing, inserting dill barb splice(s), or by replacing refrigerant hoses and restore the system to normal operating condition with no leaks.

1.9 Purge System

Given one air conditioning system, the student will purge the entire system or a component according to the air conditioning or equipment service manufacturers' instructions.

1.10 Remove and replace clutch and hub assembly

Given three (3) bench jobs or as cars become available, the student will remove and replace the clutch and hub assembly on all three compressors without damage to related components.

1.11 Remove and replace compressor gas shaft seal

Given three (3) compressors (including one each Tecumseh, Air Temp, and Frigidaire), the student will remove and replace three gas shaft seals on different vehicles without damage to related components or refrigerant loss after charging system.

1.12 Remove and replace compressor valve plates

Given two (2) compressors, each from different manufacturers, the student will remove and replace the valve plates on both compressor types without damage to parts and without refrigerant loss after charging.

ACCESSORIES-AIR CONDITIONING (Cont.)

1.13 Remove and replace compressors

Given a vehicle, the student will remove and replace the compressor without damage to the vehicle or related components while maintaining proper belt alignment.

1.14 Remove and replace thermostatic expansion valve

Given two (2) air conditioned vehicles, factory-installed or dealer-installed (add-on) systems, the student will remove and replace the thermostatic expansion valves without damage or refrigerant loss after recharging.

1.15 Remove and replace EPR valve (Evaporator Pressure Regulator)

Given an air conditioned vehicle, the student will remove and replace an EPR valve without damage or refrigerant loss after recharging.

1.16 Remove and replace POA valve (Pilot Operated Absolute)

Given an air conditioned vehicle, the student will remove and replace POA valve (pre-1974) or VIR type without damage or refrigerant loss after recharging.

1.17 Remove and replace condensor

Given an air conditioned vehicle, the student will remove and replace the vehicle air conditioning condensor without damage to related components or refrigerant loss after charging.

1.18 Performance-test system for temperatures

Given a minimum of two (2) air conditioned (A/C) vehicles from different manufacturers, the student will make a performance test on the vehicle air conditioners, determining temperature level and pressures according to manufacturers' procedure.

1.19 Diagnose refrigerant problems

Given air conditioned shop units, the student will diagnose three (3) different problem conditions and make correct recommendations for report.

1.20 Add oil under pressure

Given three (3) air conditioned (A/C) vehicles, the student will add refrigeration oil to the charged systems without leakage, as vehicles are available.

ACCESSORIES-AIR CONDITIONING (Cont.)

1.21 Overhaul compressors

Given four (4) air conditioned (A/C) vehicles (including York, Tecumseh, Air Temp, and GM rotary), the student will rebuild to proper serviceability four (4) different vehicle compressors without leakage or noise.

1.25 Service control cables and switches

Given a vehicle equipped with A/C, the student will check and repair any defective control cables and switches and all controls and registers will operate.

1.27 Adjust compressor belt tension

Given any vehicle with A/C, the student will adjust belt tension to manufacturers' specifications.

2.0 TASK GROUP: ACCESSORIES-HEATERS

TASK GOAL: Given any vehicle with a malfunctioning heater, the student will be able to diagnose and repair any malfunction encountered so that the heater operates to manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

2.1 Diagnose heating system malfunctions

Given a vehicle, the student will diagnose and record heating system malfunctions and prescribe and perform needed repairs so the heating system operates properly.

2.2 Inspect, remove, and replace defrost ducts

Given a vehicle, the student will inspect, remove and replace any heater ducts found to be defective with 100% accuracy.

2.4 Inspect and replace heater hoses

Given two (2) vehicle heater systems and switches, the student will inspect and replace heater hoses as needed without damage to heater component or leaks after installation.

2.5 Replace heater control valves

Given a vehicle, the student will replace heater control valves without damage or leakage to system.

2.6 Remove and replace heater core

Given a vehicle with leaking heater core, the student will remove and replace heater core and component accessories without damage to heater core or components without any leaks.

3.0 TASK GROUP: CHASSIS, ELECTRICAL COMPONENT SERVICE

TASK GOAL: Given any vehicle with trouble in any of the electrical components, the student will be able to diagnose and repair the trouble and the vehicle's electrical system will operate to manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

3.1 Find schematic diagram for vehicles

Given vehicle wiring schematics, the student will locate and follow a schematic diagram and identify symbols, coding, and circuit routing with 100% accuracy.

3.2 Identify wire gauge and color code identification

Given three (3) vehicle wiring harnesses from different manufacturers, the student will identify wire gauge and color code identification with 100% accuracy.

3.3 Splice wires and connect terminals, solderless/solder

Given four (4) different gauge wires including 10, 12, and 14 gauge wire, the student will splice wires and ends with crimp connectors or with rosin core solder. There will be no cold joints or exposed ends when completed.

3.4 Isolate open circuits, grounds and short circuits

Given two (2) vehicles, the student will use a test light to isolate open circuits, ground circuits, and short circuits on both vehicles' electrical systems and repair circuits to operate normally.

3.5 Test, remove, and replace switches, circuit breakers, and fuses

Given three (3) vehicles from different manufacturers, the student will test, remove and replace defective switches, circuit breakers, and fuses on the vehicles to restore normal operation of the affected circuits without damage to additional components.

3.6 Perform operational inspection of lighting systems

Given three (3) vehicles from different manufacturers, the student will perform operational inspection on lighting systems according to manufacturers' specifications.

CHASSIS, ELECTRICAL COMPONENT SERVICE (Cont.)

3.7 Test, remove, and replace light, sockets and connections

Given three (3) vehicles, the student will determine the condition and repair the lights, sockets, and connections on the three vehicles' lighting systems and all lights will operate.

3.8 Identify defective flasher units and replace

Given three (3) vehicles from different manufacturers, the student will replace flasher units; all directional signals and emergency signals will function properly.

3.9 Test and repair turn-signal unit

Given three (3) vehicles from different manufacturers, the student will test and repair turn-signal units and identify any defects. All directional lamps will operate normally.

3.10 Adjust headlights

Given four (4) vehicles from different manufacturers, the student will adjust the vehicles' headlights to state inspection specifications.

3.11 Adjust, repair, or replace back-up light switch

Given a vehicle, the student will adjust, repair, or replace back-up light switches and lights will operate when vehicle is in reverse gear.

3.12 Test and repair horn circuit

Given a vehicle, the student will test and repair horn circuit and horn will operate properly when completed.

3.13 Test, remove, and replace faulty instrument gauges and warning lamps

Given two (2) vehicles from different manufacturers, the student will test instrument gauges and warning lamps for correct operations and remove and replace any defective gauges or lamps with 100% accuracy.

3.14 Remove and replace gauge sending units (fuel, temperature, oil etc.)

Given two (2) vehicles, the student will remove and replace gauge sending units (fuel, temperature, oil, ammeter, shunt) without damage and the gauge(s) will operate correctly.

CHASSIS, ELECTRICAL COMPONENT SERVICE (Cont.)

3.16 Repair windshield wiper mechanisms or controls

Given a vehicle, the student will repair or replace windshield wiper mechanism or control and wipers will operate in all switch positions.

3.17 Test blower motor for open and grounds

Given two (2) vehicles from different manufacturers, the student will test, remove, and replace the blower motors; the motors will operate at all speeds without binding or noise.

3.18 Test, remove, and replace cruise control units

Given a vehicle, the student will test and remove and replace cruise control unit without damage and the unit will maintain and resume speed settings.

3.19 Test wiper blades and arms

Given a vehicle, the student will identify and correct any problem with wiper blades and arms so water will be removed from all areas of wiper travel.

3.20 Analyze cause of vehicle electrical fires

Given two (2) vehicles with simulated open circuits, the student will use a test light, voltmeter and/or ohmmeter to isolate problems existing in electrical systems and repair circuits to operate normally.

3.21 Test, remove and replace stop light switches

Given a vehicle, the student will adjust, repair, or replace the stop light switch so that the stop lights operate during vehicle braking.

3.22 To test & repair automatic alarm systems of safety items

Given two (2) vehicles from different manufacturers, the student will test safety items for correct operation and remove and replace any defective components to provide correct operation.

4.0 TASK GROUP: STARTING SYSTEM

TASK GOAL: After completion of this module, the student will be able to diagnose and repair any trouble in any section of the starting system and the vehicle will start every time attempted.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

4.1 Test starting system

Given four (4) vehicles from four different automotive manufacturers, the student will test the starting system and its component parts, isolating the cause or failure and make recommendations for repair.

4.2 Remove and replace solenoid

Given two (2) vehicles from two (2) different automotive manufacturers, the student will remove and replace solenoid without damage to solenoid and be able to start the vehicles each time attempted after installation.

4.3 Remove and replace starter motor

Given two (2) vehicles from two (2) different automotive manufacturers, the student will be able to remove and replace starter motor so that it operates properly with proper alignment and no dragging.

4.4 Overhaul starter

Given three (3) starting motors from three (3) different vehicle manufacturers and parts, the student will disassemble, overhaul, and reassemble starter so that it operates properly with proper amperage draw.

4.5 Remove and replace ignition switch

Given a vehicle, the student will remove and replace the ignition switch so that all electrical components operate properly after installation.

5.0 TASK GROUP: CHARGING SYSTEM

TASK GOAL: After completion of this module, the student will be able to diagnose and repair any trouble with a charging system so that the system will perform to manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

5.1 Remove and replace alternator belt

Given an alternator-equipped vehicle, the student will be able to remove, replace, and tighten alternator belt to proper belt tension.

5.2 Test alternator output

Given four (4) vehicles from different manufacturers, the student will test alternator output according to manufacturers' specifications without damaging equipment or alternator.

5.3 Test voltage regulator

Given four (4) vehicles from different manufacturers, the student will hook-up and test the condition of the voltage regulator.

5.4 Remove and replace alternator

Given an alternator-equipped vehicle, the student will remove and replace the vehicle alternator without damage and it will operate properly.

5.5 Remove and replace voltage regulator

Given two (2) vehicles with external voltage regulators, the student will remove and replace the voltage regulators so that they operate properly.

5.6 Overhaul alternator

Given three (3) different alternators, the student will disassemble, overhaul, and reassemble the alternators according to manufacturers' specifications and output will be as specified by manufacturer.

CHARGING SYSTEM (Cont.)

5.7 Test d.c. generator output

Given a generator tester and two (2) d.c. generators, the student will be able to make the proper connections, and determine the condition of each generator.

5.8 Overhaul d.c. generator

Given two (2) generators the student will disassemble, test, and diagnose component condition and reassemble the generators according to manufacturers' procedure.

6.0 TASK GROUP: BATTERY

TASK GOAL: After completion of this module, the student will be able to diagnose and repair or replace any battery system malfunctions and the vehicle will start each time tried and the battery will stay charged.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

6.1 Clean battery and cables

Given three (3) vehicles, terminal removers, cleaning materials, and instructions, the student will remove, clean, and replace battery case, posts and cables without damage to the battery so that the vehicle will start each time when process is completed.

6.2 Check electrolyte level

Given three (3) batteries, battery water, and manufacturers' specifications, the student will check the electrolyte level and fill to proper level on all three (3) batteries.

6.3 Perform hydrometer test

Given three (3) batteries and a hydrometer, the student will measure and record the specific gravity of each battery cell within the accuracy of five points (0.005).

6.4 Perform capacity (load) test

Given three (3) batteries and a capacity tester, the student will perform a capacity (load) test on each battery and determine the serviceability or need for further testing of each battery.

6.5 Perform charge test (3 minute charge)

Given three (3) batteries, a battery charger, and voltmeter, the student will determine if the battery is sulfated or if it can be returned to service.

6.6 Perform cell probe test

Given three (3) batteries, cell probes, capacity tester, battery charger, and voltmeter, the student will correctly perform and record individual cell tests on each battery and decide each battery's serviceability.

BATTERY (Cont.)

6.7 Charge batteries

Given three (3) batteries, hydrometer, and battery charger, the student will correctly determine the state of charge and charge the battery at the correct rate and amount of time necessary to bring each battery to full charge.

6.8 Service or replace battery box and hold down

Given two vehicles (2), the student will clean, service or replace battery box and hold down and tighten to proper tension so the battery will be held securely.

7.0 TASK GROUP: ENGINE SERVICE-COOLING SYSTEM

TASK GOAL: After completion of this module, the student will be able to diagnose and repair any cooling system problems and the vehicle will not over heat or leak under normal driving conditions.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

7.1 Check liquid coolant level and restore amount

Given a vehicle, the student will determine amount of contaminants and restore system to manufacturer's specifications.

7.2 Check and replace all drive belts, coolant hoses, pulleys, and overflow tank

Given five (5) vehicles, the student will check and replace, as necessary, the drive belts, coolant hoses, pulleys, and overflow tank to meet manufacturers' specifications.

7.3 Check baffles and fins for restriction

Given two (2) vehicles, the student will check the baffles and fins of a radiator for restriction and clean, as necessary, to the satisfaction of the instructor.

7.4 Check exhaust leakage in cooling system

Given a chemical-type tester, the student will determine exhaust leakage into the cooling system on five (5) vehicles.

7.5 Remove and replace radiator and shroud

Given three (3) vehicles (one 6 cylinder, two V-8) equipped with air conditioners, the student will remove and replace the radiator and shroud without damage to the vehicle or components.

7.6 Check and replace thermostat and housing

Given one (1) vehicle, the student will check and replace a thermostat and housing without leakage, damage, or overheating of the vehicle.

ENGINE SERVICE-COOLING SYSTEM (Cont.)

7.7 Check and replace water pump

Given two (2) vehicles, one with air conditioning, the student will remove and replace the water pump without leakage, damage, or belt misalignment and the vehicle will not overheat.

7.8 Check and replace core plugs (freeze plugs)

Given a vehicle with a V-8 engine, the student will check and replace the core plugs to the satisfaction of the instructor.

7.9 Check coolant freezing point

Given three (3) vehicles, the student will determine the specific gravity reading and determine the systems freezing point.

7.10 Check coolant temperature

Given one vehicle, the student will be able to measure coolant temperature.

7.11 Check and replace fan

Given three (3) vehicles, the student will inspect and evaluate the condition of the engine fan assembly, and if defective, replace it according to manufacturers' instructions.

7.12 Inspect and replace radiator hoses

Given a vehicle, the student will replace the upper and lower hose without damage to components; the system will not leak and all belts will have the correct tension.

7.13 Replace fan clutch

Given two (2) vehicles equipped with a thermostatic fan clutch, the student will determine the condition of the fan clutch assembly according to manufacturers' specifications.

7.14 Test & replace coolant pressure cap

Given both short and long neck cooling systems, the student will pressure test both caps.

ENGINE SERVICE-COOLING SYSTEM (Cont.)

7.15 Test Thermostat operation

Given two (2) vehicles, the student will check and replace a thermostat and housing without leakage, damage, or overheating of the vehicle.

7.16 Pressure test cooling system

Given an engine, the student will pressurize the cooling system according to equipment manufacturer's instructions and find all external leaks.

8.0 TASK GROUP: ENGINE SERVICE-ENGINE TESTS

TASK GOAL: After completion of this module, the student will be able to diagnose problems of compression, coolant loss, overheating, fluid leaks, vacuum leaks, engine noises, or exhaust leaks and make correct recommendations for repair.

Given safety procedures, service manuals, manufacturers' specifications, proper tools, and equipment, the student will obtain the following competencies:

TASK NUMBER:

8.1 Make wet and dry compression test

Given a minimum of two (2) vehicles with compression problems, the student will make a wet and dry compression test to determine the cause of compression loss to the satisfaction of the instructor.

8.2 Diagnose coolant loss

Given three (3) vehicles with coolant loss, the student will determine the reason for the loss (internal and external) and necessary steps taken to repair.

8.5 Diagnose vacuum leaks

Given four (4) vehicles with vacuum leaks, the student will determine the cause (hoses, manifold, carburetor, emission devices, pneumatic controls) to the satisfaction of the instructor.

8.6 Use cylinder leakage tester

Given a vehicle with compression problems, the student will make a leak down test to determine the cause of compression loss to the satisfaction of the instructor.

8.7 Diagnose mechanical engine noise

Using a stethoscope or other listening device, the student will determine the location of mechanical noises and necessary steps of repair on seven (7) vehicles to the satisfaction of the instructor.

9.0 TASK GROUP: EXHAUST SYSTEM

TASK GOAL: After completion of this module, the student will be able to diagnose and repair exhaust system problems without leaks or rattles when completed.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

9.1 Remove, replace or repair heat riser

Given three (3) vehicles with an inoperative heat riser, the student will remove, replace, or repair, as necessary, heat riser to the satisfaction of the instructor.

9.2 Remove and replace exhaust manifold

Given two (2) vehicles (including at least one V-8), the student will accurately remove and replace the exhaust manifold without exhaust leakage or damage.

9.3 Remove and replace mufflers, resonators, exhaust pipes, and extensions

Given two (2) vehicles, the student will remove and replace the muffler, resonator, exhaust pipe, and extension without damage or rattles.

9.4 Inspect for exhaust leaks

Given a vehicle, the student will visually trace exhaust system and inspect for leaks.

9.5 Check for exhaust restrictions

Given a vehicle, the student will visually trace the exhaust systems and inspect for restrictions and/or use a vacuum gauge to check for restrictions.

10.0 TASK GROUP: MAJOR SERVICE-ENGINE

TASK GOAL: After completion of this module, the student will be able to remove, disassemble, reassemble, and replace an engine and make all necessary repairs to the block assembly so that the engine will perform to manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

10.1 Remove and replace engine

Given a vehicle, the student will remove and replace the engine assembly and install the hood and all accessories without damage so that all operate normally.

10.2 Remove cylinder ridge

Given an engine and a ridge reamer, the student will remove the ridge caused by ring contact from the top inside of the cylinder wall without damage to cylinder wall.

10.3 Remove and replace rods and pistons

Given two (2) engines, the student will remove and replace rods and pistons from the cylinders in proper order, using plastigage to check bearing oil clearances and torquing rod nuts to manufacturers' specifications.

10.4 Disassemble, inspect and reassemble piston/rod

Given six (6) pistons with rods attached, the student will disassemble, inspect rod alignment, fit piston pin, measure rod bore out of round, and reassemble piston/rod without damage to any related parts.

10.5 Measure and service piston assembly

Given six (6) pistons, the student will remove the rings, clean grooves, clean top, mike skirt size, check fit in cylinder block, check new ring end gap in block, install rings on piston and measure side clearance without damage to pistons or rings.

MAJOR SERVICE-ENGINE (Cont.)

10.6 Remove, service and replace crankshaft and bearings

Given two (2) engines, the student will remove the crankshaft, mike all journals, plastigage all bearings, correctly time crankshaft to camshaft, install oil seals, and torque main bolts to manufacturers' specifications; the crankshaft will turn freely when completed.

10.7 Remove and replace rear main oil seal in car

Given a vehicle with the engine in the vehicle, the student will correctly remove and replace the rear main oil seal without oil leakage from oil pan or rear seal.

10.8 Measure cylinder bore

Given any engine, the student will measure the cylinder bore for taper, out-of-round and diameter to within ± .001 of an inch.

10.9 De-glaze cylinder

Given any cylinder block, the student will de-glaze the cylinders to establish a cross-hatch pattern.

10.10 Remove and replace camshaft, and lifters

Given two (2) engines, the student will remove and replace the camshaft, and lifters with proper alignment of oiling holes, time camshaft to crankshaft, without damage to any related parts and the engine will run properly when completed.

10.11 Remove & replace camshaft bearings

Given a block the students will remove and replace camshaft bearings.

10.12 Bore cylinder oversize

Given a block, the student will bore all cylinders, finish cylinder walls, and fit pistons according to industry standards.

10.13 Inspect head for warp

Given a straight edge and flat feeler gauge, the student will check for cylinder head warpage and compare to manufacturers' specifications.

MAJOR SERVICE-ENGINE (Cont.)

10.14 Inspect block for warp

Given a straight edge and flat feeler gauge, the student will check for cylinder block warpage and compare to manufacturers' specifications.

10.15 Measure crankshaft and camshaft journal size using micrometers

Given a micrometer the student will measure crankshaft and camshaft bearing journals and compare to manufacturers' specifications.

10.16 Remove and replace flywheel

Given a flywheel with a defective ring gear, the student will remove and replace the ring gear maintaining proper radial and lateral run-out.

10.17 Remove and replace flywheel ring gears

Given two (2) flywheels with defective ring gears, the student will determine which method is necessary to change the gear, then complete the task with gear true.

10.18 Replace gaskets and seals

Given a vehicle, the student will remove and replace oil gaskets and seals with no leaks.

10.19 Remove and replace oil pan

Given one engine, the student will remove and replace the oil pan without damage and oil leaks.

10.20 Remove and replace timing gears

Given one engine, the student will remove timing gears, inspect for wear according to manufacturer's procedures, replace and properly synchronize gears without damage.

10.21 Remove and replace timing sprockets and chain

Given one engine, the student will remove sprockets and chain, inspect for wear according to manufacturer's procedures, replace sprockets and chain in syncronization and without damage.

MAJOR SERVICE-ENGINE (Cont.)

10.22 Clean engine parts & check for condition

Given an engine, the student will clean all major engine components to the satisfaction of the instructor by hand, chemicals, and/or abrasive methods to perform visual, chemical or mechanical checks to be made on the components.

10.23 Measure rod to crank cheek clearance

Given four (4) connecting rods installed on in-line and V-8 engines, the student will check crank cheek clearance using feeler gauges.

10.24 Measure crank cheek to main thrust bearing clearance

Given an engine with crankshaft installed, the student will use a dial indicator or feeler gauge to measure crankshaft end-play (thrust bearing clearance).

10.25 Pressure test block for leaks

Using a cooling system leak tester to pressurize the entire cooling system, the student will check for external leaks.

11.0 TASK GROUP: MINOR SERVICE-ENGINES

TASK GOAL: After completion of this module, the student will be able to remove and replace motor mounts, valve cover gaskets, intake manifold, timing gear cover and harmonic balancer, valve stem seals, and oil pump and be able to change oil and filter and adjust valves; the vehicle will perform satisfactorily when each task is completed.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

11.1 Remove and replace motor mounts

Given a minimum of one (1) vehicle, the student will remove and replace the motor mounts. The fan will not hit the shroud or radiator and the transmission will shift properly when completed.

11.2 Change oil and filter

Given any late engine, the student will change the oil and filter without damage to related parts or oil leakage and all attachments will operate normally.

11.3 Remove and replace valve cover gaskets

Given a vehicle, the student will remove and replace the valve cover gaskets without damage or oil leakage and all attachments will operate normally.

11.4 Adjust valves

Given two (2) engines (one hydraulic, one solid type lifter), the student will adjust the valve lash to meet manufacturers' specifications.

11.5 Remove and replace intake manifold

Given a vehicle, the student will remove and replace the intake manifold without vacuum leaks or oil leaks and the engine will run correctly when completed.

11.6 Remove and replace timing gear cover and harmonic balancer

Given a vehicle, the student will remove and replace harmonic balancer and the timing gear cover and seal correctly without oil leaks in gaskets or seals.

MINOR SERVICE-ENGINES (Cont.)

11.7 Remove and replace valve stem seals (with cylinder head installed)

Given any engine, the student will remove and replace valve stem oil seals using compressed air to hold valves closed. The engine will operate correctly without oil leakage into cylinder.

11.8 Remove and replace oil pump

Given a vehicle, the student will remove and replace the oil pump, time drive gear to distributor, and install oil pan without leakage and the vehicle will have proper oil pressure.

11.9 Perform operational inspection of lubricating system

Given a vehicle the student will check for proper oil pressure and locate oil leakage from gaskets and connections.

11.10 Inspect rear main oil seal for leaks

Given a vehicle the student will inspect the rear main oil seal for leaks.

12.0 TASK GROUP: VALVE TRAIN

TASK GOAL: After completion of this module, the student will be able to remove and replace cylinder head and perform all necessary head machine work; the valves will seat properly and not leak oil by the valve guides.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

12.1 Remove and replace cylinder heads (gasket)

Given two (2) engines, the student will remove cylinder head rods and rocker arm assembly, clean and inspect cylinder head, and torque to manufacturers' specifications; the engine will not leak coolant, oil or vacuum from cylinder head and the engine will operate normally.

12.2 Check and assemble cylinder heads

Given a cylinder head, the student will completely disassemble and reassemble the cylinder head assembly without damage to any parts (surfaces, valves, rocker shafts, or pivot assemblies),& check valve installed length (correct as necessary), clean and inspect all surfaces for damage and wear.

12.3 Reface valves and stems

Given sixteen (16) valves, the student will check and measure valve stem wear, resurface valve face and stem (end) to factory specified angle so that the face and stems are free of any chatter marks or low places on surface to satisfaction of the instructor.

12.4 Resurface valve seats

Given a cylinder head, the student will reface valve seats to factory specified angle and width using machinist blue or lapping compound to the satisfaction of the instructor.

12.5 Check valve springs (tension and square)

Given twelve (12) valve springs, the student will measure valve spring using height and pressure, straightness and identify any part(s) not meeting proper specifications.

VALVE TRAIN (Cont.)

12.8 Check cylinder head for cracks

Given two cylinder heads, the student will check for cracks using either a magnetic particle, flourescent, or dye system to the satisfaction of the instructor.

12.9 Determine valve guide to valve stem clearance

Given a cylinder head and a plug gage and micrometer, the student will measure the maximum and minimum clearance between the valve guides and valve stems and determine whether each guide is within specifications.

12.10 Recondition valve guide

Given a cylinder head, the student will correct defective valve guide(s) by machining, replacing, or reconditioning to restore to original manufacturers' specifications.

13.0 TASK GROUP: POWER TRAIN-AUTOMATIC TRANSMISSION

TASK GOAL: After completion of this module, the student will be able to diagnose and repair an automatic transmission so that it shifts at the correct speed and does not leak.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

13.1 Check and add transmission fluid to proper level

Given three (3) vehicles and fluid, the student will bring the fluid to proper level according to manufacturers' specifications.

13.2 Change fluid and filter

Given two (2) vehicles, fluid, filter, and gaskets, the student will change fluid and filter; the vehicles will shift and not leak.

13.3 Adjust throttle linkage

Given a vehicle, the student will adjust the throttle linkages so that the carburetor will open fully, return to idle without sticking, and the downshift will occur at the proper time.

13.4 Adjust column or floor shift linkage

Given two (2) vehicles from different American automobile manufacturers, the student will adjust the transmission linkage so that the transmission will shift into all positions with detent in correct alignment and start in the neutral and park positions.

13.5 Adjust neutral safety switch

Given two (2) vehicles with column shifts and one with floor shift, the student will adjust the neutral safety switch until the vehicles will start in the neutral and park position.

13.6 Adjust electrical kick-down switch

Given a vehicle with an electrical kick-down switch, the student will adjust the switch to kick-down at proper throttle opening each time.

POWER TRAIN-AUTOMATIC TRANSMISSIONS (Cont.)

13.7 Remove and replace and check vacuum modulator

Given two (2) vehicles on which the vacuum modulator indicates malfunctions, a vacuum pump, and necessary parts, the student will check and replace modulator, as necessary; the transmission will shift at correct speeds each time.

13.8 Remove and replace transmission or engine mounts

Given a vehicle with bad transmission mounts, the student will install new mounts; the shift linkage will be in proper alignment.

13.9 Adjust bands

Given two (2) bench transmissions and gasket, the student will adjust the bands; the bands must be within specifications each time.

13.10 Stall and oil pressure test transmission

Given a vehicle, oil pressure gauges, R.P.M. gauge, vacuum gauge, and specifications, the student will check the oil pressures at R.P.M.'s for correctness and record each time.

13.11 Diagnose cooler problems

Given a vehicle with cooler problems and fluid, the student will determine if the problem is in the engine cooling system, the transmission cooling system, or if the converter is overheating.

13.12 Clean cooler system

Given a cooler that is dirty and fluid, the student will clean the cooler so that it will have proper flow and not leak.

13.13 Repair minor leaks

Given two (2) vehicles, the student will repair minor transmission leaks so that there is no leakage after each repair.

13.14 Install auxiliary coolers

Given an auxiliary cooler and fluid, the student will install the cooler so the fluid will circulate properly and have no leaks in the system.

POWER TRAIN-AUTOMATIC TRANSMISSIONS (Cont.)

13.15 Remove and replace transmission

Given a vehicle and new fluid, the student will remove and accurately replace automatic transmission for serviceability without leakage and the transmission will shift according to manufacturers' specifications.

13.16 Remove and replace housing, bushing, and seals

Given either three (3) vehicles or bench transmission, parts and fluid, the student will remove and replace seals and bushings without nicks, burrs, or other visible damage.

13.17 Remove and replace front pump seal and bushing

Given three (3) automatic transmissions front pumps, lubricant, and parts, the student will install the pump seals and bushing so that the seal and bushing in the transmission will not leak when transmission is installed and put into service.

13.18 Assemble and disassemble transmission by units

Given three (3) transmissions from different manufacturers, proper parts, and fluid, the student will disassemble by units each transmission and reassemble so that the transmission shafts will turn and units apply when air-checked.

13.19 Remove and replace bushings

Given all transmission components that contain bushings, new bushings, drivers, and fluid, the student will remove and replace the bushings with no scratches or burrs and achieve accurate alignment.

13.20 Diagnose planetary gear assembly

Given three (3) vehicles with noise, diagnosis chart, and planetary gear assemblies, the student will diagnose and record planetary gear noise accurately with each assembly, diagnosing vibrations, whine, and knock.

13.21 Overhaul clutch assembly

Given four (4) clutch units, parts, and fluid, the student will completely overhaul the clutch units; the units must be assembled and function properly when air-checked.

POWER TRAIN-AUTOMATIC TRANSMISSIONS (Cont.)

13.22 Diagnose and repair governor

Given a vehicle with a malfunctioning governor, parts, fluid, and a diagnosis chart, the student will be able to determine if the governor is causing the problem; the student will then remove, repair, or replace the faulty governor and the transmission will shift correctly and not leak.

13.23 Diagnose and clean valve body

Given a vehicle with a malfunction, parts, fluid, and a diagnosis chart, the student will be able to determine that the valve body is causing the problem; the student will remove, check for mate surface, and clean or replace valve body to correct the malfunction.

13.24 Diagnose and remove and replace overrunning sprag

Given two (2) transmissions from different manufacturers, parts, and fluid, the student will inspect, remove and replace sprag unit so that sprag locks in proper direction.

13.25 Check converter removed from car

Given two (2) torque converters and leak tester, the student will check for bad stator, turbine, housing, and leaks with accuracy.

14.0 TASK GROUP: CLUTCH

TASK GOAL: After completion of this module, the student will be able to diagnose and repair any clutch problems to meet manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment the student will obtain the following competencies:

TASK NUMBER:

14.1 Adjust clutch pedal linkage

Given a vehicle, the student will adjust the pedal linkage to an accuracy of 1/16 inch.

14.2 Road test and noise diagnosis

Given a vehicle with clutch bearing or flywheel malfunction, the student will road test and correctly describe noise encountered and probable cause and correction required of either clutch bearing or flywheel.

14.3 Replace clutch assembly and/or release bearing and fork

Given a vehicle with malfunctioning clutch and/or release bearing and fork, the student will remove and replace clutch assembly and/or release bearing and fork so that proper and smooth engagement and release is provided.

14.4 Replace pilot bearing

Given a vehicle, the student will replace a pilot bearing to provide proper fit as per manufacturers' specifications.

14.5 Check flywheel and housing runout and flatness

Given a vehicle, the student will check flywheel runout and housing runout, determine serviceability, and recommend repair or replacement of part or parts satisfactorily.

14.6 Inspection of parts

Given an assortment of clutch parts, the student will be able to inspect and diagnose defective clutch disc, pressure plate, and related clutch parts and correctly identify good and faulty parts.

CLUTCH (Cont.)

14.7 Repair hydraulic type clutch

Given a vehicle with a hydraulic clutch, the student will rebuild or replace hydraulic master cylinder and/or slave cylinder so that the clutch operates properly and correct throw out bearing clearance is maintained.

15.0 TASK GROUP: DRIVE LINE

TASK GOAL: After completion of this module, the student will be able to diagnose and repair any drive line problems encountered to meet manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

15.1 Road test and diagnose drive line noise and vibrations

Given three (3) vehicles with drive line malfunctions, the student will road test and perform any other test necessary to correctly diagnose the existing problems.

15.2 Remove and replace drive shaft assembly

Given three (3) vehicles, the student will remove and replace drive shaft assembly and align properly; the drive line will not vibrate when work is completed.

15.3 Overhaul drive line assembly

Given two (2) drive lines with cross and trunion type joints and two (2) drive lines with constant velocity joints, the student will correctly install U-joint assemblies, overhaul constant velocity joints and replace center carrier bearings, if applicable; the drive line will not vibrate when the work is completed.

15.4 Check drive line and pinion angle

Given two (2) vehicles with incorrect pinion angle, shims, and protractor, the student will set the pinion angle within manufacturers' specifications on both vehicles.

15.5 Lubricate and service U-joints

Given one (1) vehicle, the student will lubricate and service U-joints.

15.6 Replace Universal joints

Given one (1) vehicle, the student will remove and replace the U-joints. The drive line will operate properly upon completion.

DRIVE LINE (Cont.)

15.7 Check drive line end-play and run-out

Given a vehicle, the student will determine drive line end-play and run-out.

16.0 TASK GROUP: FINAL DRIVE

TASK GOAL: After completion of this module, the student will be able to diagnose and repair problems in any section of the final drive without noise or leakage when work is completed.

Given safety procedures, service manuals, manufacturers' specifications, proper tools, and equipment, the student will obtain the following competencies:

TASK NUMBER:

16.1 Road test and diagnose final drive noise

Given one (1) vehicle with final drive noise from different manufacturers and diagnosis chart, the student will road test and properly diagnose and record the noise correctly.

16.2 Remove and replace rear axle

Given two (2) vehicles, each with a different type of rear axle, the student will remove and replace the rear axles on both vehicles without lubricant leakage, noise or damage to component parts during installation.

16.3 Remove and replace pinion seals

Given two (2) vehicles from different manufacturers, the student will remove and replace pinion seals, torque pinion nut to proper specifications, and road test so when completed there will be no noise or leaks.

16.4 Inspect for proper lubricant type and level

Given three (3) vehicles, the student will check for proper lubricant level, type, and change or add with 100% accuracy.

16.5 Remove and replace final drive assembly

Given two (2) vehicles of which one has an integral final drive assembly and one has a removable carrier assembly, the student will remove and replace final drive assemblies and when completed, the vehicle final drives will track and operate properly without leaks.

FINAL DRIVE (Cont.)

16.6 Overhaul carrier assembly

Given three (3) vehicles, of which one has an integral carrier assembly and one has limited slip carrier assembly and one has standard-type removable carrier, the student will completely overhaul carrier assemblies, make all adjustments, and road test vehicles so when completed, the vehicles will perform without any noise in the carrier assemblies and without leakage.

16.7 Inspect and repair four wheel drive locking hub

Given a four wheel drive unit, the student will disassemble, inspect and repair the drive locking hubs and return them to manufacturer's specifications.

16.8 Inspect four wheel drive mechanisms

Given a four wheel drive vehicle, the student will inspect the unit for wear and possible malfunctions.

16.9 Replace rear axle bearing and seals

Given two (2) vehicles, each with a different type of rear axle, the student will remove and replace the rear axles, bearings and seals on both vehicles without lubricant leakage, noise or damage to component parts during installation.

17.0 TASK GROUP: STANDARD TRANSMISSION

TASK GOAL: After completion of this module, the student will be able to diagnose and repair problems with the standard transmission; the transmission will not make noise or jump out of gear.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

17.1 Inspect for proper lubricant type and level

Given three (3) different vehicles with standard transmissions, the student will check lubricant for proper level and will inspect fluid for metal fragments; then the student will fill or change the fluid in accordance to manufacturers' specifications.

17.2 Adjust shift linkage

Given two (2) vehicles from different manufacturers, the student will adjust the linkage of standard three or four speed transmissions to provide smooth and proper shifting in all ranges.

17.3 Remove and replace transmission mounts

Given a vehicle, the student will replace the transmission mount or mounts in such a manner that proper drive line and transmission alignment is obtained without creating vibrations and assuring proper linkage adjustment after installation.

17.4 Road test car for noise diagnosis

Given two (2) vehicles with standard transmission noise from different manufacturers, the student will road test and properly diagnose the noise.

17.5 Remove and replace extension housing seal and bushing

Given two (2) vehicles from different manufacturers and suitable puller and driver, the student will replace the extension housing bushing and seal so proper yoke fit is obtained and no leakage occurs.

STANDARD TRANSMISSION (Cont.)

17.6 Remove and replace transmission

Given a vehicle, the student will remove and replace the standard transmission and return the car to service without leakage, vibrations, or pilot bushing or bearing damage.

17.7 Overhaul three speed standard transmission

Given four (3 three speed and one (1) four speed, 5 speed optional) transmissions from different manufacturers, the student will disassemble and reassemble the standard transmission to provide smooth and proper operation in all ranges without noise, leakage, or vibrations.

17.8 Inspection of internal parts

Given three (3) transmissions from different manufacturers, the student will inspect and determine serviceability of gears, bearing, and internal parts of transmissions to meet manufacturers' specifications.

17.10 Remove and replace input and output shaft bearings

Given one transmission, the student will remove the input and output shaft bearings, check the bearings for wear and replace the bearings, reassemble the transmission to provide proper operation in all ranges without noise or vibrations.

18.0 TASK GROUP: BRAKE SERVICE

TASK GOAL: After completion of this module, the student will be able to diagnose and repair any type brake defect and when the job is completed, the vehicle will stop in the prescribed stopping distance and will not pull the vehicle from side to side.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

18.1 Diagnose brake system

Given a vehicle, the student will road test or dynometer test the brake system for stopping distance, pedal height, and brake hardness according to the manufacturers' specifications; the student will pull left front wheel to check for lining wear and drum condition and describe existing condition.

18.2 Remove and replace brake lines and hose

Given a vehicle with cut or leaking brake hose, the student will remove and replace the cut or leaking brake hose, stopping all leaks and without damaging the hoses and pedal will be proper height.

18.3 Bleed hydraulic systems

Given two (2) vehicles, the student will bleed two brake systems according to manufacturers' specifications; there will be no air left in system and brake warning light will remain off.

18.4 Adjust parking brake

Given two (2) vehicles, the student will free cables and parking brake, adjust the parking brakes to hold the car from rolling when the emergency brake is applied.

18.5 Remove and replace brake power booster

Given a vehicle and parts, the student will remove and replace the power brake system so that the system and power booster operate correctly each time brakes are applied.

BRAKE SERVICE (Cont.)

18.6 Remove and replace proportioning/metering valve

Given a vehicle and parts, the student will replace the proportioning valve to manufacturer's specifications without damage or leakage.

18.7 Overhaul master cylinder (dual)

Given two (2) dual master cylinders, and parts, the student will overhaul and/or replace the dual master cylinders according to manufacturers' specifications and without leakage.

18.8 Reline drum-type brakes

Given two (2) vehicles equipped with different types of drum-type brakes, the student will inspect & replace worn backing plate, remove and replace worn brake shoes or linings on each without pulling and with proper pedal height.

18.9 Cam grind brake shoes

Given two (2) sets of brake shoes, the student will cam grind brake shoe linings to fit drums according to manufacturers' specifications.

18.10 Inspect, measure and turn brake drums

Given four (4) brake drums (two front drums and two rear drums), the student will inspect drums for cracks, smoothness, taper, bell mouth, deep grooves, scoring, and out-of-round; then the student will gauge and machine until drum is smooth and less than .060" oversize.

18.11 Remove, replace and overhaul wheel cylinders

Given four (4) wheel cylinders which will polish or hone with .002--.003 inch tolerance; the student will overhaul all four wheel cylinders according to manufacturers' specifications and replace without leakage.

18.12 Adjust drum brakes

Given four (4) vehicles from different manufacturers, the student will adjust brakes on in-service automobiles to the pedal height as specified by the manufacturer.

BRAKE SERVICE (Cont.)

18.13 Reline disc type brakes

Given three (3) vehicles from different manufacturers, the student will remove and replace worn disc brake linings without pulling or fading when completed.

18.14 Inspect, measure and reface disc brake rotors

Given four (4) rotors from four (4) different manufacturers, the student will machine four disc brake rotors to specifications and according to drum lathe operating instructions.

18.15 Remove, replace and overhaul calipers

Given four (4) calipers from four (4) different manufacturers, the student will overhaul brake calipers without leakage.

18.16 Recondition backing plates

Given one backing plate with worn or grooved shoe contact areas, the student will build the surface by welding, machine and shape the surface to the original contour so the installed shoes will move freely.

19.0 TASK GROUP: STEERING

TASK GOAL: After completion of this module, the student will be able to diagnose and repair any steering problems encountered and the vehicle will not leak steering gear fluid, the steering wheel will not be off center, and there will be no slack in the steering gear.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment the student will obtain the following competencies:

TASK NUMBER:

19.1 Diagnose steering problems

Given two (2) vehicles (one with manual steering and one with power steering), the student will diagnose and record steering problems and prescribe and perform needed repairs on each vehicle so the steering system operates properly.

19.2 Remove and replace power steering lines

Given two (2) vehicles with defective hydraulic lines and new lines, the student will remove and replace the power steering lines and the system will not leak after installation.

19.3 Remove and replace power steering pump

Given a vehicle equipped with power steering, the student will remove and replace the power steering pump, belt, power steering hose, and will fill reservoir to proper level. The unit will not leak or belt slip when completed.

19.4 Remove and replace manual steering gear assembly

Given a vehicle with manual steering, the student will remove and replace the manual steering gear.

19.5 Remove and replace power steering gear assembly

Given a vehicle equipped with power steering, the student will remove and replace the steering gear assembly so that it will turn fully in both directions and not leak.

19.6 Remove and replace steering wheel

Given a vehicle and puller, the student will remove and replace the steering wheel, aligning the steering wheel correctly without damaging component parts and the horn and turn indicators will operate properly.

STEERING (Cont.)

19.7 Remove and replace rod end, center link, and idler arm

Given a vehicle, the student will diagnose the degree of wear and remove and replace tie rod ends, center link, and idler arm; tie rod ends will be set correctly and steering wheel centered.

19.8 Overhaul manual steering gear assembly

Given a vehicle with manual steering, the student will overhaul the manual steering gear, maintaining proper clearance and smooth operation, in accordance with manufacturers' specifications.

19.9 Overhaul power steering unit pump

Given two (2) vehicles with power steering, the student will overhaul the power steering unit, maintaining proper clearances and smooth operation without leakage.

19.11 Overhaul power steering pump

Given two (2) vehicles equipped with power steering, the student will overhaul the power steering pumps without vane noise or leaks.

19.12 Adjust worm and sector in steering box

Given two (2) different types of steering gear boxes, the student will adjust worm and sector to manufacturers' specifications.

19.13 Lubricate steering box and linkage

Given two (2) different types of steering gear boxes, the student will lubricate box to manufacturers' specifications.

19.14 Rebuild power steering cylinder

Given a vehicle the student will remove, inspect and rebuild a power steering slave cylinder and the unit will not leak.

19.15 Inspect and replace steering damper

Given three (3) types of steering dampers, the student will inspect, repair and replace, if necessary, the dampers to correct steering malfunctions.

STEERING (Cont.)

19.16 Remove and overhaul the rack and pinion power steering unit

Given one (1) mock-up with rack and pinion steering, the student will remove, simulate overhaul and replace steering components.

19.17 Remove, overhaul or replace McPherson struts

Given two (2) different types of McPherson struts, the student will simulate overhaul procedure in order to make necessary repairs where needed.

20.0 TASK GROUP: SUSPENSION

TASK GOAL: After completion of this module, the student will be able to diagnose and repair suspension or alignment problems and the vehicle will not squeak, vibrate, sag, or pull from side to side while driving after being completed

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

20.1 Rotate tires

Given two (2) vehicles, the student will inspect tires and wheels and rotate the tires using manufacturers' recommendations.

20.2 Balance tires

Given four (4) vehicles, the student will balance the tires using the high speed balancer on two (2) and a bubble balancer on two (2) so that all tires will be balanced within an accuracy of 1/4 oz.

20.3 Lubricate front suspension

Given two (2) vehicles, the student will properly lubricate the front suspension without overlooking any grease fittings and following the vehicle manufacturers' recommendations.

20.4 Diagnose wear and alignment problems

Given four (4) vehicles, the student will inspect and diagnose the front suspension and determine and record what problems exist.

20.5 Remove, replace, clean, repack, and adjust front wheel bearings and seals

Given two (2) vehicles, the student will remove four (2 sets) wheel bearings, clean, inspect, and replace, as needed, worn bearings, repack, and adjust to factory specified tightness.

20.6 Align front end

Given three (3) vehicles, the student will check the tire pressure and align the front end of three cars with 100% accuracy according to manufacturers' specifications; the vehicle will not "drift" or "pull" in either direction.

SUSPENSION (Cont.)

20.7 Remove and replace shock absorbers

Given two (2) vehicles, the student will remove and replace front and rear shocks without rattles or looseness.

20.8 Remove and replace coil springs

Given a vehicle, the student will remove and replace front and rear coil springs to restore vehicle to specified height.

20.9 Remove and replace torsion bar

Given a vehicle equipped with torsion bar suspensions, the student will remove and replace torsion bars on the automobile so that after torsion bars are installed, the vehicle will be level from side to side.

20.10 Remove and replace leaf springs and spring shackles

Given a vehicle equipped with leaf springs, the student will remove and replace leaf springs, spring shackles and bushings so that after component parts are installed, the vehicle will be level and will track properly without noise or squeaks.

20.11 Remove and replace upper and lower control arms

Given a vehicle, the student will remove and replace upper and lower control arms and replace shaft bushings without damage to component parts.

20.12 Remove and replace ball joints

Given two (2) vehicles equipped with riveted or bolted ball joints, the student will remove and replace upper and lower ball joints, one with upper spring and one with lower spring; the vehicles will be level from side to side and not make noise when front end is pushed up and down.

20.13 Remove and replace stabilizers, sway bar, strut bar, and bushings

Given a vehicle, the student will remove and replace stabilizers, sway bar, strut bar, and bushings; the vehicle will not squeak or have bumping noises when front end is pushed up and down.

SUSPENSION (Cont.)

20.14 Remove and replace king pins

Given a vehicle equipped with king pin suspension, the student will remove and replace one set of floating king pin bushings and ream one set of king pin bushings in accordance with manufacturer's specifications.

20.15 Inspect tires and wheels

Given a vehicle the students will inspect the tires and wheels for abnormal wear and damage.

21.0 TASK GROUP: CARBURETOR

TASK GOAL: After completion of this module, the student will be able to diagnose and repair carburetor problems to meet manufacturers' and EPA specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

21.1 Test and repair heated air intake system

Given two (2) vehicles (one with vacuum motor and one with capsule control sensory device) and engine analyzer or vacuum gauge, the student will test and repair heated carburetor air systems in accordance with manufacturers' specifications.

21.2 Test and replace the manifold heat control valve

Given two (2) vehicles and necessary parts, the student will check and replace the heat control valve or vacuum motor and sensor so that it operates.

21.3 Check and replace the temperature sensor

Given two (2) vehicles and temperature gauge, the student will check or replace the temperature sensors so that they work properly.

21.4 Test and repair automatic choke

Given two (2) types of automatic chokes (one piston type or diaphram and one with electric heating element), the student will test and repair automatic choke to manufacturers' specifications.

21.5 Remove, replace and overhaul carburetor

Given three (3) vehicles (one single barrel, one two barrel, and one four barrel carburetor) and parts, the student will remove, overhaul, adjust and replace carburetor without leaks.

21.6 Test, repair and adjust carburetor controls

Given three (3) vehicles (one single barrel, one two barrel, and one four barrel carburetor) and testing equipment, the student will make all the necessary adjustments and calibrations as set forth by EPA standards.

CARBURETOR (Cont.)

21.7 Adjust air screws on carburetor and idle RPM

Given one (1) vehicle (two barrel or four barrel carburetor), the student will adjust the air screws and idle RPM to manufacturers' specifications.

21.8 Test and replace the hot idle compensator valve

Given two (2) vehicles, vacuum gauge, and analyzer, the student will be able to test and replace hot idle compensator valve; the linkage will not stick and vehicle will idle according to specifications.

21.9 Test CO and hydrocarbons with infra-red analyzer

Given three (3) engines, the student will use an infra-red analyzer to measure CO and hydrocarbons at idle and high speed and satisfactorily report to the instructor the mechanical condition of the engine, the condition of the carburetor and ignition system.

21.10 Adjust carburetor idle mixture with tachometer

Given three (3) engines, the student will adjust the idle mixture according to manufacturers' procedure and the engine will idle smoothly and at the specified idle speed.

21.11 Adjust carburetor idle mixture (CO) with infra-red analyzer

Given three (3) engines and the manufacturers' CO valve at idle, the student will adjust the carburetor idle mixture screws according to manufacturers' procedure, meet the CO specifications and the engine will idle and run satisfactorily.

22.0 TASK GROUP: IGNITION

TASK GOAL: After completion of this module, the student will be able to diagnose and repair ignition problems to meet manufacturers' standards.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

22.1 Test engine on oscilloscope and accurately report reading of test patterns

Given a domestic automobile and an ocilloscope, the student will be able to connect leads, operate scope, analyze scope patterns, and correctly report malfunctions in the engine's performance.

22.2 Test and repair or replace the ignition primary circuit including points, condensor, coil, wiring, and ignition switch

Given an automobile, the student will be able to accurately test and replace or repair any part of the primary ignition circuit to the satisfaction of the instructor.

22.3 Test and recondition or replace the parts of the secondary circuit of the ignition system

Given an automobile, the student will be able to accurately test the secondary circuit of the ignition system and replace any defective parts; the secondary circuit will be in correct operation when completed.

22.4 Remove and replace distributor

Given three (3) vehicles from different manufacturers, the student will remove and replace an ignition distributor so that the distributor is timed in such a manner that the vehicle will start.

22.5 Overhaul distributor

Given three (3) different types of distributors from different manufacturers and parts, the student will disassemble, overhaul, and reassemble distributor to meet manufacturers' specifications.

IGNITION (Cont.)

22.6 Test, repair, and adjust distributor controls

Given three (3) different types of distributors from different manufacturers, the student will be able to test, repair, and adjust the distributor controls to 90% accuracy on any domestic auto.

22.7 Test and/or replace automatic spark advance

Given three (3) different vehicles from different manufacturers, the student will test the automatic spark advance system and replace components as necessary; the vehicle spark advance mechanism will perform to manufacturers' specifications when completed.

22.8 Clean, gap, test spark plugs

Given one (1) spark plug, the student will clean, gap and test plugs to meet manufacturer's specifications.

22.9 Measure resistance in plug wire

Given one (1) spark plug wire, the student will measure resistance, with proper equipment, to determine serviceability.

22.10 Locate and repair shorts and opens

Given a vehicle and proper equipment, the student will locate and repair shorts and opens.

23.0 TASK GROUP: EMISSION CONTROLS

TASK GOAL: After completion of this module, the student will repair, replace, or adjust emission control components on a vehicle to comply with specifications on emission levels accepted by government agencies.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

23.1 Check PCV valve system

Given three (3) vehicles, the student will be able to diagnose and repair defective PCV valve systems on domestic autos to meet prescribed emission levels.

23.2 Test and repair the air injection reaction type system

Given a vehicle with air-type system, the student will be able to diagnose and repair an air injection system on any domestic auto to meet prescribed emission levels.

23.3 Test and repair exhaust gas recirculation systems

Given two (2) vehicles, the student will test, repair, or replace the exhaust gas recirculation system on any domestic auto according to the manufacturers' procedure.

23.4 Test and repair ignition spark control exhaust emission systems

Given two (2) vehicles, the student will test and if necessary, repair the vacuum advance/retard system on any auto according to the manufacturers' procedure.

24.0 TASK GROUP: FUEL SYSTEM

TASK GOAL: After completion of this module, the student will be able to diagnose and repair fuel system problems to meet manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

24.1 Check and/or replace fuel and air filters

Given a vehicle, the student will check and/or replace the fuel and air filters properly and without leaks.

24.2 Test and replace fuel lines and hoses

Given two (2) vehicles and parts, the student will test and replace fuel lines so there is no leakage.

24.3 Test and replace fuel pump

Given three (3) vehicles, the student will test fuel pump for leaks, pressure, and volume and replace pump (if needed) without any leaks or damage.

24.4 Test and repair evaporative emission control systems

Given a vehicle, the student will test, repair, or replace the evaporative emission control system according to manufacturers' specifications on all domestic automobiles.

24.5 Check for moisture and foreign particles

Given a vehicle, the student will inspect and if necessary, remove the fuel filters to check for foreign particles and water, clean and/or replace the filter so there is no leakage.

24.6 Inspect and service gas tank and cap

Given two (2) vehicles, the student will inspect and service gas tank, filler neck, and cap and repair as necessary.

1.0 TASK GROUP: ACCESSORIES - AIR CONDITIONING

TASK GOAL: Given any vehicle with a malfunctioning air conditioning system, the student will be able to diagnose and correct any malfunction encountered so that the system operates to manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

1.1 Connect manifold gauges to system

Given five (5) conditioned vehicles, three of which must differ in manufacturer, the student will connect the gauge set (high and compound) to the refrigeration system with the compound gauge on the suction line and the high pressure gauge on the discharge line correctly on each attempt.

1.2 Purge R-12 to atmosphere

Given five (5) air conditioned vehicles and manifold gauge set, the student will purge system R-12 to the atmosphere to 0 p.s.i.g.

1.3 Evacuate refrigeration system

Given five (5) air conditioned vehicles and manifold gauge set and evacuation pump, the student will evacuate all vehicle air conditioning systems to 1500 microns p.s.i.a. and maintain the pressure under evacuation for one-half hour.

1.4 Charge system using "pound" cans

Given five (5) air conditioned vehicles and pound cans of R-12, the student will charge five vehicle refrigeration systems through the low (suction) side according to industry practices and accepted safety standards 100% of the time.

1.5 Charge system using a bulk source

Given three (3) air conditioned vehicles from different manufacturers and a bulk source of R-12 (5-50 lb. drum), the student will measure and charge all vehicle refrigeration systems with R-12 to specified charge.

ACCESSORIES - AIR CONDITIONING (Cont.)

1.6 Perform leak test with halide torch

Given one (1) air conditioned (A/C) vehicle and a halide torch, the student will leak test the A/C and determine the source of any existing leaks.

1.7 Perform lead test with electronic tester

Given three (3) vehicles from different manufacturers and an electronic type tester, the student will leak test the vehicle air conditions and determine the source of any existing leaks.

1.8 Repair or replace refrigerant lines and line connectors

Given two (2) air conditioned vehicles, the student will repair refrigerant line either by flaring copper tubing, flaring aluminum tubing, inserting dill barb splice(s), or by replacing refrigerant hoses, restoring the system to normal operating condition.

1.9 Purge system

Given one air conditioning (A/C) system, the student will purge the freon without significant loss of oil.

1.10 Remove and replace clutch and hub assembly

Given three (3) air conditioned vehicles, the student will remove and replace the clutch and hub assembly on all three compressors within proper specifications without damage to related components.

1.11 Remove and replace compressor gas shaft seal

Given three (3) compressors (including one each Tecumseh, Air Temp, and Frigidaire), the student will remove and replace three (3) gas shaft seals on different vehicles without damage to related components or refrigerant loss after charging system.

1.12 Remove and replace compressor valve plates

Given two (2) compressors, each from different manufacturers, the student will remove and replace the valve plates on both compressor types without damage to parts and without refrigerant loss after charging.

ACCESSORIES - AIR CONDITIONING (Cont.)

1.13 Remove and replace compressors

Given a vehicle, the student will remove and replace the compressor without damage to the vehicle or related components while maintaining proper belt alignment.

1.14 Remove and replace thermostatic expansion valve

Given two (2) air conditioned vehicles--factory-installed systems, VIR (valve in receiver) systems, or dealer-installed (add-on) systems, the student will remove and replace the thermostatic expansion valves without damage or refrigerant loss after recharging.

1.15 Remove and replace EPR valve (Evaporator Pressure Regulator)

Given an air conditioned vehicle, the student will remove and replace an EPR valve without damage or refrigerant loss after recharging.

1.16 Remove and replace POA valve (Pilot Operated Absolute)

Given an air conditioned vehicle, the student will remove and replace POA valve (pre-1974) or VIR type without damage or refrigerant loss after recharging.

1.17 Remove and replace condensor

Given an air conditioned vehicle, the student will remove and replace the vehicle air conditioning condensor without damage to related components or refrigerant loss after recharging while maintaining proper clearances.

1.18 Performance-test system for temperatures

Given three (3) air conditioned vehicles from different manufacturers, the student will make a performance-test on the vehicle air conditioners, determining temperature level according to manufacturers' outlined procedure.

1.19 Diagnose refrigerant problems

Given any air conditioned system from any manufacturer, the student using gauges, feel and observation, will correctly diagnose such problems as: line restrictions, stuck EPR valve, low or high head pressure, proper cycling, etc.

1.20 Add oil under pressure

Given three (3) air conditioned vehicles, the student will determine and add refrigeration oil as per manufacturers' specifications.

ACCESSORIES - AIR CONDITIONING (Cont.)

1.21 Overhaul compressors

Given air conditioning compressors (including York, and/or Tecumseh, Air Temp, and GM Rotary), the student will rebuild them to proper serviceability without leakage or noise.

1.22 Repair automatic air and heater vacuum and electrical circuits

Given a vehicle equipped with electro-pneumatic controls, the student will determine with accuracy the location, test procedure, operation of electro-pneumatic controls, and serviceability.

1.23 Remove and replace fan motor

Given a malfunctioning or defective fan motor, the student will replace the fan motor without damage to other components and test for proper operation.

1.24 Remove and replace dryer

Given a vehicle with moisture symptoms, the student will properly remove and replace the dryer, adhering to industry standards.

1.26 Identify pneumatic components and connections from schematics

Given two (2) vehicles from different manufacturers and using a schematic of a vehicle pneumatic system, the student will identify with 90% accuracy the proper hose routing and connections for a given vehicle to insure correct operation of the system.

1.27 Adjust compressor belt tension

Given any vehicle with air conditioning, the student will adjust belt tension to manufacturers' specifications.

1.28 Test vacuum components

Given two (2) vehicles with defective pneumatic systems, the student, without error, will test the systems and determine malfunctioning component(s).

1.29 Test mechanical-pneumatic controls

Given a vehicle equipped with mechanical-pneumatic controls, the student will determine, with 90% accuracy, the cause and location of system malfunction.

ACCESSORIES - AIR CONDITIONING (Cont.)

1.30 Test thermo-pneumatic controls

Given two (2) vehicles equipped with thermo-pneumatic controls from different manufacturers, the student will determine the location, test procedure, and operation of thermo-pneumatic controls to the satisfaction of the instructor.

1.31 Remove and replace or repair pneumatic components

Given two (2) vehicles with pneumatic systems, the student will remove and replace or repair, if repairable, the affected component(s) and return the pneumatic system to normal operating condition

2.0 TASK GROUP: ACCESSORIES - HEATERS

TASK GOAL: Given any vehicle with a malfunctioning heater, the student will be able to diagnose and repair any malfunction encountered so that the heater operates to manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

2.1 Diagnose heating system malfunctions

Given a vehicle, the student will diagnose and record heating system malfunctions and prescribe and perform needed repairs so the heating system operates properly.

2.2 Inspect, remove, and replace defrost ducts

Given a vehicle, the student will inspect, remove, and replace any heater ducts found to be defective with 100% accuracy.

2.3 Inspect and replace control cables and switches

Given two (2) vehicles from different manufacturers, the student will inspect and replace faulty cable and switches so that the smooth operation of such units will be obtained after each installation.

2.4 Inspect and replace heater hoses

Given two (2) vehicle heater systems and switches, the student will inspect and replace heater hoses as needed maintaining proper routing without damage to heater component or leaks after installation.

2.5 Replace heater control valves

Given a vehicle, the student will replace heater control valves without damage or leakage to system.

2.6 Remove and replace heater core

Given a vehicle with leaking or plugged heater core, the student will remove and replace heater core and component accessories without damage to heater core or components and there will be no leaks and hot air will be created.

3.0 TASK GROUP: CHASSIS, ELECTRICAL-COMPONENT SERVICE

TASK GOAL: Given any vehicle with trouble in any of the electrical components, the student will be able to diagnose and repair the trouble where the vehicle's electrical system will operate to manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

3.1 Find schematic diagram for vehicles

Given a vehicle wiring schematic, the student will follow a schematic diagram and identify symbols, coding, and circuit routing with 100% accuracy.

3.2 Identify wire gauge and color code identification

Given three (3) vehicle wiring harnesses from different manufacturers, the student will identify wire gauge and color code identification with 100% accuracy.

3.3 Splice wires and connect terminals, solderless/solder

Given four (4) different gauge wires including 10, 12, and 14 gauge wire, the student will splice wires and ends with proper connectors or with rosin core solder. There will be no cold joints or exposed ends when completed.

3.4 Isolate open grounds and shorts

Given two vehicles with simulated open circuits, ground circuits, and short circuits, the student will use a test light, voltmeter, and/or ohmmeter to isolate problems existing in electrical systems and repair circuits to operate normally.

3.5 Test, remove, and replace switches, circuit breakers, and fuses

Given three (3) vehicles from different manufacturers with simulated or real malfunctions, the student will test, remove, and replace defective switches, circuit breakers, and fuses on the vehicles to restore normal operation of the affected circuits without damage to additional components.

3.7 Test, remove, and replace light, sockets, and connections

Given three (3) vehicles, the student will determine the condition and repair the lights, sockets, and connections on the three vehicles' lighting systems to normal operation.

CHASSIS, ELECTRICAL-COMPONENT SERVICE (Cont.)

3.8 Identify defective flasher units and replace

Given three (3) vehicles from different manufacturers, the student will identify defective flasher units and replace flasher units; all directional signals and emergency signals will function properly.

3.9 Test and repair turn-signal unit

Given three (3) vehicles from different manufacturers, the student will test and repair turn-signal units and identify any defects. All directional lamps will operate normally.

3.10 Adjust headlights

Given four (4) vehicles from different manufacturers, the student will adjust the vehicle's headlights to the state specifications.

3.11 Adjust, repair, or replace back-up light switch

Given a vehicle, the student will adjust, repair or replace back-up light switches and lights will operate when vehicle is in reverse gear.

3.12 Test and repair horn circuit

Given a vehicle, the student will test and repair horn circuit and horn will operate when completed.

3.13 Test and identify faulty instrument gauges and warning lamps

Given two (2) vehicles from different manufacturers, the student will test instrument gauges and warning lamps for correct operations and remove and replace any defective gauges or lamps with 100% accuracy.

3.14 Remove and replace gauge sending units (fuel, temperature, oil, etc.)

Given two (2) vehicles, the student will remove and replace gauge sending units (fuel, temperature, oil, ammeter, shunt) without damage and the gauge(s) will operate correctly.

3.15 Replace chassis wiring

Given a vehicle, the student will repair or replace chassis wiring as required and all circuits will operate.

CHASSIS, ELECTRICAL-COMPONENT SERVICE (Cont.)

3.16 Repair windshield wiper mechanisms or controls

Given a vehicle, the student will repair or replace windshield wiper mechanism or control and wipers will operate in all switch positions.

3.18 Test, remove, and replace cruise control units

Given a vehicle, the student will test and remove and replace cruise control unit without damage and the unit will maintain and resume speed settings.

4.0 TASK GROUP: STARTING SYSTEM

TASK GOAL: After completion of this module, the student will be able to diagnose and repair any trouble in any section of the starting system and the vehicle will start every time attempted.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

4.1 Test starting system

Given four (4) vehicles from four different automotive manufacturers, the student will test the starting system and its component parts, isolating the cause or failure and make recommendations for repair.

4.2 Remove and replace solenoid

Given two (2) vehicles from two (2) different automotive manufacturers, one being GM, the student will remove and replace solenoid without damage to solenoid and be able to start the vehicles each time attempted after installation.

4.3 Remove and replace starter motor

Given two (2) vehicles from two (2) different automotive manufacturers, the student will be able to remove and replace starter motor so that it operates properly with proper alignment and no dragging.

4.4 Overhaul starter

Given three (3) starting motors from three (3) different design types, the student will disassemble, overhaul, and reassemble starter so that it operates properly with proper amperage draw.

4.5 Remove and replace ignition switch

Given a vehicle, the student will remove and replace the ignition switch so that all electrical components operate properly after installation.

5.0 TASK GROUP: CHARGING SYSTEM

TASK GOAL: After completion of this module, the student will be able to diagnose and repair any trouble with a charging system so that the system will perform to manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

5.1 Remove and replace alternator belt

Given an alternator equipped vehicle, the student will be able to remove, replace, and tighten alternator belt to proper belt tension.

5.2 Test alternator output

Given vehicles representing integral solid state, external solid state and mechanical regulators, the student will test alternator output according to manufacturers' specifications without damaging equipment or alternator.

5.3 Test voltage regulator

Given four (4) vehicles from different manufacturers, the student will hook-up and test the condition of the regulator and set, if needed, in accordance with manufacturers' specifications and without damage to equipment or regulator.

5.4 Remove and replace alternator

Given an alternator equipped vehicle, the student will remove and replace the vehicle alternator without damage and it will operate properly.

5.5 Remove and replace voltage regulator

Given two (2) vehicles with external voltage regulators, the student will remove and replace the voltage regulators so that they operate properly.

5.6 Overhaul alternator

Given two (2) different alternators, the student will disassemble, overhaul, and reassemble the alternators according to manufacturers' specifications and output will be as specified by manufacturer.

6.0 TASK GROUP: BATTERY

TASK GOAL: After completion of this module, the student will be able to diagnose and repair or replace any battery system malfunctions and the vehicle will start each time tried and the battery will stay charged.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

6.1 Clean battery and cables

Given three (3) vehicles, terminal removers, cleaning materials, and instructions, the student will remove, clean, and replace battery case, posts, and cables without damage to the battery so that the vehicle will start each time when process is completed.

6.2 Check electrolyte level

Given three (3) batteries, battery water, and manufacturers' specifications, the student will check the electrolyte level and fill to proper level on all three (3) batteries.

6.3 Perform hydrometer test

Given three (3) batteries and a hydrometer, the student will measure and record the specific gravity of each battery cell within the accuracy of five points (0.005).

6.4 Perform capacity (load) test

Given three (3) batteries and a capacity tester, the student will perform a capacity (load) test on each battery and determine the serviceability or need for further testing of each battery.

6.5 Perform charge test (3 minute charge)

Given three (3) batteries, a battery charger, and voltmeter. the student will determine if the battery is sulfated or if it can be returned to service.

6.7 Charge batteries

Given three (3) batteries, hydrometer, and battery charger, the student will correctly determine the state of charge and charge the battery at the correct rate and amount of time necessary to bring each battery to full charge.

7.0 TASK GROUP: ENGINE SERVICE - COOLING SYSTEM

TASK GOAL: After completion of this module, the student will be able to diagnose and repair any cooling system problems and the vehicle will not heat or leak under normal driving conditions.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

7.1 Check liquid coolant level and restore strength and amount

Given five (5) vehicles, the student will determine the hydrometer reading and restore system condition to manufacturers' specifications.

7.2 Check and replace all defective drive belts, coolant hoses, pulleys, and overflow tank

Given five (5) vehicles, the student will check and replace, as necessary, the drive belts, coolant hoses, pulleys, and overflow tank to meet manufacturers' specifications.

7.3 Check baffles and fins for restriction

Given two (2) vehicles, the student will check the baffles and fins of a radiator for restriction and clean, as necessary, to the satisfaction of the instructor.

7.4 Check exhaust leakage in cooling system

Given a suitable tester, the student will determine exhaust leakage into the cooling system on five (5) vehicles.

7.6 Check and replace thermostat and housing

Given three (3) vehicles, the student will check and replace a thermostat and housing without leakage, damage, or overheating of the vehicle.

7.7 Check and replace water pump

Given four (4) vehicles (at least two V-8 with air conditioning), the student will check and replace the water pump and fan assembly without leakage, damage, or belt pulley misalignment.

ENGINE SERVICE - COOLING SYSTEM (Cont.)

7.8 Check and replace core plugs (freeze plugs)

Given a vehicle with a V-8 engine, the student will check and replace the core plugs to the satisfaction of the instructor.

7.11 Check & replace fan

Given three (3) vehicles, the student will inspect and evaluate the condition of the engine fan assembly and, if defective, replace it according to manufacturer's instructions.

7.13 Replace fan clutch

Given two (2) vehicles equipped with thermostatic fan clutch, the student will determine the condition of the fan clutch assembly according to manufacturer's specifications.

7.14 Test & replace coolant pressure cap

Given both short and long neck cooling systems, the student will pressure test both caps.

7.16 Pressure test cooling system

Given a vehicle, the student will check a cooling system with a pressure tester and find all external leaks.

8.0 TASK GROUP: ENGINE SERVICE - ENGINE TESTS

TASK GOAL: After completion of this module, the student will be able to diagnose problems of compression, coolant loss, overheating, fluid leaks, vacuum leaks, engine noises, or exhaust leaks and make correct recommendations for repair.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

8.1 Make wet and dry compression test

Given three (3) vehicles with compression problems, the student will make a wet and dry compression test, leak down test, or balance test to determine the cause of compression loss to the satisfaction of the instructor.

8.2 Diagnose coolant loss

Given three (3) vehicles with coolant loss, the student will determine the reason for the loss (internal and external) and necessary steps taken to repair.

8.3 Diagnose overheating problem

Given three (3) overheating vehicles, the student will determine the cause (cooling, exhaust, or engine condition) and the necessary steps to correct the problem.

8.4 Diagnose fluid leaks

Given four (4) vehicles with fluid leakage, the student will determine the location of the leak (transmission, brakes, steering, fuel, engine oil, coolant, refrigerant) to the satisfaction of the instructor.

8.5 Diagnose vacuum leaks

Given four (4) vehicles with vacuum leaks, the student will determine the cause (hoses, manifold, carburetor, emission devices, pneumatic controls) to the satisfaction of the instructor.

8.7 Diagnose mechanical engine noise

Using a stethoscope or other listening device, the student will determine the location of mechanical noises and necessary steps of repair on seven (7) vehicles to the satisfaction of the instructor.

ENGINE SERVICE - ENGINE TESTS (Cont.)

8.8 Diagnose exhaust leaks

Given three (3) vehicles with exhaust leaks, the student will determine the location and necessary repairs to the satisfaction of the instructor.

9.0 TASK GROUP: EXHAUST SYSTEM

TASK GOAL: After completion of this module, the student will be able to diagnose and repair exhaust system problems without leaks or rattles when completed.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

9.1 Remove, replace or repair heat riser

Given three (3) vehicles with an inoperative heat riser, the student will remove, replace, or repair, as necessary, heat riser to the satisfaction of the instructor.

9.2 Remove and replace exhaust manifold

Given two (2) vehicles (including at least one V-8), the student will accurately remove and replace the exhaust manifold without exhaust leakage or damage.

9.3 Remove and replace mufflers, resonators, exhaust pipes, and extensions

Given two (2) vehicles, the student will remove and replace muffler, resonator, exhaust pipe, and extension without damage or rattles.

9.4 Inspect for exhaust leaks

Given a vehicle, the student will visually trace exhaust system and inspect for leaks.

9.5 Check for exhaust restrictions

Given a vehicle, the student will visually trace the exhaust systems and inspect for restrictions and/or use a vacuum gauge to check for restrictions.

10.0 TASK GROUP: MAJOR SERVICE - ENGINE

TASK GOAL: After completion of this module, the student will be able to remove, disassemble, reassemble, and replace an engine and make all necessary repairs to the block assembly so that the engine will perform to manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

10.1 Remove and replace engine

Given a vehicle, the student will remove and replace the engine assembly and install the hood and all accessories without damage so that all operate normally.

10.2 Remove cylinder ridge

Given an engine and a ridge reamer, the student will remove the ridge caused by ring contact from the top inside of the cylinder wall without damage to cylinder wall.

10.3 Remove and replace rods and pistons

Given two (2) engines, the student will remove and replace rods and pistons from the cylinders in proper order, using plastigage to check bearing oil clearances and torquing rod nuts to manufacturers' specifications.

10.4 Disassemble, inspect, and reassemble piston/rod

Given six (6) pistons with rods attached, the student will disassemble, inspect rod alignment, fit piston pin, measure rod bore out of round, and reassemble piston/rod without damage to any related parts.

10.5 Measure and service piston assembly

Given six (6) pistons, the student will remove the rings, clean and inspect grooves, clean top, mike skirt size, check fit in cylinder block, check new ring end gap in block, install rings on piston, and measure side clearance without damage to pistons or rings.

MAJOR SERVICE - ENGINE (Cont.)

10.6 Remove, service, and replace crankshaft and bearings

Given two (2) engines, the student will remove the crankshaft, mike all journals, plastigage all bearings, correctly time crankshaft to camshaft, install oil seats, torque main bolts to manufacturers' specifications, check crankshaft and play, install rods, and check rod to crank cheek clearance; the crankshaft will turn freely when completed.

10.7 Remove and replace rear main oil seal

Given a vehicle, with the engine in the vehicle, the student will correctly remove and replace the rear main oil seal without oil leakage from oil pan or rear seal.

10.8 Measure cylinder bore

Given any engine, the student will measure the cylinder bore for taper, out-of-round and diameter to within $\pm$ .001" of instructor's.

10.9 De-glaze cylinder

Given any cylinder block, the student will de-glaze and clean the cylinders to establish a cross-hatch pattern.

10.10 Remove and replace camshaft and lifters

Given two (2) engines, the student will remove and replace the camshaft and lifters with proper alignment of oiling holes, time camshaft to crankshaft without damage to any related parts and the engine will run properly when completed.

10.11 Remove and replace camshaft bearings

Given two (2) engines, the student will remove and replace defective camshaft, bearings, timing chain and sprokets, and lifters with proper alignment of oiling holes, time camshaft to crankshaft, without damage to any related parts and the engine will run properly when completed.

10.12 Bore cylinder oversize

Given a block, the student will bore all cylinders and finish cylinder walls to industry standards.

10.13 Inspect head for warp

Given a straightedge and flat feeler gauge, the student will check for cylinder head warpage and compare to manufacturers' specifications.

MAJOR SERVICE - ENGINE (Cont.)

10.14 Inspect block for warp

Given a straightedge and flat feeler gauge, the student will check for cylinder block warpage and compare to manufacturer's specifications.

10.15 Measure crankshaft and camshaft journal size using micrometers

Given a micrometer, the student will measure crankshaft and camshaft bearing journals and compare to manufacturer's specifications.

10.16 Remove and replace flywheel

Given a vehicle, the student will remove flywheel, check for heat checks, flatness and general condition and replace by torquing in sequence to specifications.

10.17 Remove & replace oil pan

Given one engine, the student will remove and replace the oil pan without damage and oil leaks.

10.20 Remove & replace timing gears

Given one engine, the student will remove timing gears, inspect for wear according to manufacturer's specifications, and replace and properly synchronize gears without damage.

10.21 Remove & replace timing sprockets & chain

Given one engine, the student will remove sprokets and chain, inspect for wear according to manufacturer's procedures, and replace sprockets and chain/gears in synchronization without damage.

10.22 Clean engine parts & check for condition

Given an engine, the student will clean all major engine components to the satisfaction of the instructor by hand, chemical and/or abrasive methods to perform visual, chemical, or mechanical checks on the components.

10.23 Measure rod to crank cheek clearance

Given four (4) connecting rods installed on an in-line and V-8 engine, the student will check crank cheek clearance using feeler gauges.

MAJOR SERVICE - ENGINE (Cont.)

10.24 Measure crank cheek to main thrust bearing clearance

Given an engine with crankshaft installed, the student will use a dial indicator or feeler gauge to measure crankshaft end-play (thrust bearing clearance).

11.0 TASK GROUP: MINOR SERVICE - ENGINE

TASK GOAL: After completion of this module, the student will be able to remove and replace motor mounts, valve cover gaskets, intake manifold timing gear cover and harmonic balancer, valve stem seals, and oil pump and be able to change oil and filter and adjust valves; the vehicle will perform satisfactorily when each task is completed.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

11.1 Remove and replace motor mounts

Given two (2) vehicles, the student will remove and replace the motor mounts. The fan will not hit the shroud or radiator and the transmission will shift properly when completed.

11.2 Change oil and filter

Given any late engine, the student will change the oil and filter without damage to related parts or oil leakage and all attachments will operate normally.

11.3 Remove and replace valve cover gaskets

Given a vehicle, the student will remove and replace the valve cover gaskets without damage or oil leakage and all attachments will operate normally.

11.4 Adjust valves

Given two (2) engines (one hydraulic, one solid type lifter), the student will adjust the valve lash to meet manufacturers' specifications.

11.5 Remove and replace intake manifold

Given a vehicle, the student will remove and replace the intake manifold without vacuum leaks or oil leaks and the engine will run correctly when completed.

11.6 Remove and replace timing gear cover and harmonic balancer

Given a vehicle, the student will remove and replace harmonic balancer and the timing gear cover and seal to meet instructor's satisfaction.

MINOR SERVICE - ENGINE (Cont.)

11.7 Remove and replace valve stem seals (with cylinder head installed)

Given any engine, the student will remove and replace valve stem oil seals using compressed air to hold valves closed. The engine will operate correctly when completed.

11.8 Remove and replace oil pump

Given a vehicle, the student will remove and replace the oil pump and install oil pan without leakage and the vehicle will have proper oil pressure.

11.10 Inspect rear main oil seal for leaks

Given a vehicle, the student will visually inspect for rear main oil seal leaks.

12.0 TASK GROUP: VALVE TRAIN

TASK GOAL: After completion of this module, the student will be able to remove and replace cylinder head and perform all necessary machine work; the valves will seat properly and not leak oil by the valve guides.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

12.1 Remove and replace cylinder heads (gasket)

Given two (2) engines, the student will remove cylinder head rods and rocker arm assembly, clean and inspect cylinder head and block and torque to manufacturers' specifications; the engine will not leak coolant, oil or vacuum from cylinder head and the engine will operate normally.

12.2 Check and assembly cylinder heads

Given a cylinder head, the student will completely disassemble and reassemble the cylinder head assembly, check valve installed length (correct as necessary), clean and inspect all surfaces for damage, and use a straightedge and feeler gauge to determine flatness without damage to any parts (surfaces, valves, rocker shafts, or pivot assemblies).

12.3 Reface valves and stems

Given sixteen (16) valves, the student will resurface valve face and stem (end) to factory specified angle so that the face and stems are free of any chatter marks or low places on surface to the satisfaction of the instructor.

12.4 Resurface valve seats

Given a cylinder head, the student will reface valve seats to factory specified angle, width, and seat overlap using a properly ground valve and machinist blue to the satisfaction of the instructor.

12.5 Check valve springs (tension and square)

Given sixteen (16) valve springs, the student will measure valve spring using height and pressure, check for squareness, and identify any part(s) not meeting proper specifications.

VALVE TRAIN (Cont.)

12.6 Machine guides for special seals

Given a cylinder head, the student will machine the valve guide upper portion to accept special valve stem seals.

12.7 Test, remove, and replace cam followers

Given a set of mechanicsl and hydraulic valve lifters, the student will determine the condition of the lifters according to manufacturer's specifications and replace the lifters without damage.

12.8 Check cylinder head for cracks

Given two cylinder heads, the student will check for cracks using either a magnetic particle, flourescent, or dye system to the satisfaction of the instructor.

12.9 Determine valve guide to valve stem clearance

Given a cylinder head and a plug gauge and micrometer, the student will determine the maximum and minimum clearance between the valve guides and valve stems and determine whether each guide is within specifications.

12.10 Recondition valve guide

Given a cylinder head, the student will correct defective valve guide(s) by machining, replacing or reconditioning to restore to original manufacturer's specification.

13.0 TASK GROUP: POWER TRAIN - AUTOMATIC TRANSMISSION

TASK GOAL: After completion of this module, the student will be able to diagnose and repair an automatic transmission so that it shifts at the correct speed and does not leak.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies.

TASK NUMBER:

13.1 Check and add transmission fluid to proper level

Given three (3) vehicles and specified fluid, the student will bring the fluid to proper level according to manufacturers' specifications.

13.2 Change fluid and filter

Given two (2) vehicles, fluid, filter, and gaskets, the student will change fluid and filter; the vehicles will shift properly and not leak.

13.3 Adjust throttle linkage

Given a vehicle, the student will adjust the throttle linkages so that the carburetor will open fully, return to idle without sticking, and the down shift will occur at the proper time.

13.4 Adjust column or floor shift linkage

Given two (2) vehicles from different American automobile manufacturers, the student will adjust the transmission linkage so that the transmission will shift into all positions with detent in correct alignment and start in the neutral and park positions.

13.5 Adjust neutral safety switch

Given two (2) vehicles with column shifts and one with floor shift, the student will adjust the neutral safety switch until the vehicles will start in the neutral and park position.

13.6 Adjust electrical or hydraulic kick-down switch

Given a vehicle with an electrical or hydraulic kick-down switch, the student will adjust the switch to kick-down at proper throttle opening each time.

POWER TRAIN - AUTOMATIC TRANSMISSION

13.7 Remove and replace and check vacuum modulator

Given two (2) vehicles on which the vacuum modulator indicates malfunctions, a vacuum pump, and necessary parts, the student will check and replace modulator, as necessary; the transmission will shift at correct speeds each time.

13.8 Inspect, remove and replace transmission or engine mounts

Given a vehicle with bad transmission mounts, the student will install new mounts; the shift linkage will be in proper alignment.

13.9 Adjust bands

Given two (2) bench transmissions and gasket, the student will adjust the bands; the bands must be within specifications each time.

13.10 Stall oil pressure test transmission

Given a vehicle, oil pressure gauges, R.P.M. gauge, vacuum gauge, and specifications, the student will check the oil pressures at R.P.M's for correctness and record each time.

13.11 Diagnose cooler problems

Given a vehicle with cooler problems and fluid, the student will determine if the problem is in the engine cooling system or the transmission cooling system.

13.12 Clean cooler system

Given a cooler that is dirty and fluid, the student will clean the cooler so that it will have proper flow and not leak.

13.13 Repair minor leaks

Given two (2) vehicles, the student will repair minor transmission leaks so that there is no leakage after each repair.

13.14 Install auxiliary coolers

Given an auxiliary cooler and fluid, the student will install the cooler so the fluid will circulate properly and have no leaks in the system.

POWER TRAIN - AUTOMATIC TRANSMISSION (Cont.)

13.15 Remove and replace transmission

Given a vehicle and new fluid, the student will remove and accurately replace automatic transmission for serviceability without leakage and the transmission will shift according to manufacturer's specifications.

13.16 Remove and replace housing, bushing, and seals

Given either three (3) vehicles or bench transmissions, parts and fluid, the student will remove and replace seals and bushings without nicks, burrs, or other visible damage.

13.17 Remove and replace front pump seal and bushing

Given three (3) automatic transmission front pumps, lubricant, and parts, the student will install the pump seals and bushing so that the seal and bushing in the transmission will no leak when transmission is installed and put into service.

13.18 Assemble and disassemble transmission by units

Given three (3) transmissions from different manufacturers, proper parts, and fluid, the student will disassemble by units each transmission and reassemble to specifications so that the transmission shafts will turn and units apply when air-checked.

13.19 Remove and replace bushings

Given all transmission components that contain bushings, new bushings, drivers, and fluid, the student will remove and replace the bushings with no scratches or burrs and achieve accurate alignment.

13.20 Diagnose planetary gear assembly noise

Given three (3) vehicles with noise, diagnosis chart, and planetary gear assemblies, the student will diagnose and record planetary gear noise accurately with each assembly, diagnosing vibrations, whine, and knock.

13.21 Overhaul clutch assembly

Given four (4) clutch units, parts, and fluid, the student will completely overhaul the clutch units; the units must be assembled and function properly when air-checked.

POWER TRAIN - AUTOMATIC TRANSMISSION (Cont.)

13.22 Diagnose and repair governor

Given a vehicle with a malfunctioning governor, parts, fluid, and a diagnoses chart, the student will be able to determine that the governor is causing the problem, the student will then remove, repair, or replace the faulty governor and the transmission will shift correctly and not leak.

13.23 Diagnose and clean valve body

Given a vehicle with a malfunction, parts, fluid, and a diagnosis chart, the student will be able to determine that the valve body is causing the problem; the student will remove, check for mate surface, and clean or replace valve body to correct the malfunction.

13.24 Diagnose and remove and replace overrunning sprag

Given two (2) transmissions from different manufacturers, parts, and fluid, the student will inspect, remove, and replace sprag unit so that sprag locks in proper direction.

13.25 Check converter removed from car

Given two (2) torque converters and leak tester, the student will check for bad stator overrunning assembly, turbine, housing, and leaks with accuracy.

14.0 TASK GROUP: CLUTCH

TASK GOAL: After completion of this module, the student will be able to diagnose and repair any clutch problems to meet manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

14.1 Adjust clutch pedal linkage

Given a vehicle, the student will adjust the pedal linkage to proper specification.

14.2 Road test and noise diagnosis

Given a vehicle with release clutch bearing or flywheel malfunction, the student will road test and correctly describe noise encountered and probable cause and correction required of either clutch bearing or flywheel.

14.3 Replace clutch assembly and/or release bearing and fork

Given a vehicle with malfunctioning clutch and/or release bearing and fork, the student will remove and replace clutch assembly and/or release bearing and fork so that proper and smooth engagement and release is provided.

14.4 Replace pilot bearing

Given a vehicle, the student will replace a pilot bearing to provide proper fit as per manufacturer's specifications.

14.5 Check flywheel and housing runout and flatness

Given a vehicle, the student will check flywheel runout and housing runout, determine serviceability, and recommend repair or replacement of part or parts satisfactorily.

14.6 Inspection of parts

Given an assortment of clutch parts, the student will be able to inspect and diagnose defective clutch disc, pressure plate, and related clutch parts and correctly identify good and faulty parts.

CLUTCH (Cont.)

14.7 Repair hydraulic type clutch

Given a vehicle with a hydraulic operated clutch, the student will rebuild or replace hydraulic master cylinder and/or slave cylinder so that clutch operates properly and correct throw-out bearing clearance is maintained.

15.0 TASK GROUP: DRIVE LINE

TASK GOAL: After completion of this module, the student will be able to diagnose and repair any drive line problems encountered to meet manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

15.1 Road test and diagnose drive line noise and vibrations

Given three (3) vehicles with drive line malfunctions, the student will road test and correctly diagnose the existing problems.

15.2 Remove and replace drive shaft assembly

Given three (3) vehicles, the student will remove and replace drive shaft assembly and align properly; the drive line will not vibrate when work is completed.

15.3 Overhaul drive line assembly

Given two (2) drive lines with cross and trunion type joints and drive lines with constant velocity joints, the student will correctly install U-joint assemblies, overhaul constant velocity joint and replace center carrier bearings, if applicable; the drive line will not vibrate when the work is completed.

15.4 Check drive line and pinion angle

Given two (2) vehicles with incorrect pinion angle, shims, and protractor, the student will set the pinion angle within manufacturers' specifications on both vehicles.

15.5 Lubricate and service U-joints

Given one (1) vehicle, the student will lubricate and service U-joints.

15.6 Replace Universal joints

Given one (1) vehicle, the student will remove and replace the U-joints; the drive line will operate properly upon completion.

DRIVE LINE (Cont.)

15.7 Check drive line end-play and run-out

Given a vehicle, the student will determine drive line end play and run-out.

16.0 TASK GROUP: FINAL DRIVE

TASK GOAL: After completion of this module, the student will be able to diagnose and repair problems in any section of the final drive without noise or leakage when work is completed.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

16.1 Road test and diagnose final drive noise

Given three (3) vehicles with final drive noise from different manufacturers and diagnosis chart, the student will road test and properly diagnose and record the noise correctly.

16.2 Remove and replace rear axle

Given two (2) vehicles, each with a different type of rear axle, the student will remove and replace the rear axles without lubricant leakage.

16.3 Remove and replace pinion seals

Given two (2) vehicles from different manufacturers, the student will remove and replace pinion seals, torque pinion nut to proper specifications, and road test so when completed there will be no noise or leaks.

16.4 Inspect for proper lubricant type and level

Given three (3) vehicles, the student will check for proper lubricant level.

16.5 Remove and replace final drive assembly

Given two (2) vehicles of which one has an integral final drive assembly and one has a removable carrier assembly, the student will remove and replace final drive assemblies and when completed, the vehicle final drives will track and operate properly without leaks.

FINAL DRIVE (Cont.)

16.6 Overhaul carrier assembly

Given three (3) vehicles, of which one has an integral carrier assembly and one has limited slip carrier assembly and one has standard-type removable carrier, the student will completely overhaul carrier assemblies, make all adjustments, and road test vehicles so when completed, the vehicles will perform without any noise in the carrier assemblies and without leakage.

16.7 Inspect and repair four wheel drive locking hubs

Given a vehicle with four wheel drive, the student will repack front wheel bearings and inspect for further defective areas and correct including transfer case, drive shafts, etc.

16.8 Inspect four wheel drive mechanism

Given a four wheel drive vehicle, the student will inspect the unit for wear and possible malfunctions.

16.9 Remove and replace axle, bearings and seals

Given two (2) vehicles, each with a different type of rear axle, the student will remove and replace the rear axles, bearings and seals on both vehicles without lubricant leakage, noise or damage to component parts during installation.

17.0 TASK GROUP: STANDARD TRANSMISSION

TASK GOAL: After completion of this module, the student will be able to diagnose and repair problems with the standard transmission; the transmission will not make noise or jump out of gear.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

17.1 Inspect for proper lubricant type and level

Given three (3) different vehicles with standard transmissions, the student will check lubricant for proper level and will inspect fluid for metal fragments; then the student will fill or change the fluid in accordance to manufacturers' specifications.

17.2 Adjust shift linkage

Given two (2) vehicles from different manufacturers, the student will adjust the linkage of standard three or four speed transmissions to provide smooth and proper shifting in all ranges.

17.3 Remove and replace transmission mounts

Given a vehicle, the student will replace the transmission mount or mounts in such a manner that proper drive line and transmission alignment is obtained without creating vibrations and assuring proper linkage adjustment after installation.

17.4 Road test car for noise diagnosis

Given two (2) vehicles with standard transmission noise from different manufacturers, the student will road test and properly diagnose the noise.

17.5 Remove and replace extension housing seal and bushing

Given two (2) vehicles from different manufacturers and suitable puller and driver, the student will replace the extension housing bushing and seal so proper yoke fit is obtained and no leakage occurs.

STANDARD TRANSMISSION (Cont.)

17.6 Remove and replace transmission

Given a vehicle, the student will remove and replace the standard transmission and return the car to service without leakage, vibrations, or pilot bushing or bearing damage.

17.7 Overhaul standard transmission

Given three (3) transmissions, one being a four speed, from different manufacturers, the student will disassemble and reassemble the standard transmission to provide smooth and proper operation in all ranges without noise, leakage, or vibrations.

17.8 Inspection of internal parts

Given three (3) transmissions from different manufacturers, the student will inspect and determine serviceability of gears, bearings, and internal parts of transmissions to meet manufacturers' specifications.

17.9 Remove and replace speedometer drive gear

Given one (1) transmission with speedometer, the student will remove and replace the drive gear, inspect for wear, and replace the drive gear. The speedometer will operate when the vehicle is driven.

17.10 Remove and replace input and output shaft bearings

Given one transmission, the student will remove the input and output shaft bearings, check the bearings for wear and replace the bearings, reassemble the transmission to provide proper operation in all ranges without noise or vibrations.

18.0 TASK GROUP: BRAKE SERVICE

TASK GOAL: After completion of this module, the student will be able to diagnose and repair any type brake defect and when the job is completed, the vehicle will stop in the prescribed stopping distance and will not pull the vehicle from side to side.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

18.1 Diagnose brake system

Given a vehicle, the student will road test or dynamometer test the brake system for stopping distance, pedal height, and brake hardness according to the manufacturers' specifications; the student will pull all wheels to check for lining wear, pad wear, rotor condition, and drum condition and identify existing condition.

18.3 Bleed hydraulic systems

Given two (2) vehicles, at least one must be disc-drum combination, the student will bleed two (2) brake systems according to manufacturers' specifications; there will be no air left in system and brake warning light will remain off.

18.4 Adjust parking brake

Given two (2) vehicles, the student will adjust the parking brakes, and free brake cables if necessary, to hold car from rolling when the emergency brake is applied.

18.5 Remove and replace brake power booster

Given a vehicle and parts, the student will remove and replace the power brake system so that the system and power booster operate correctly each time brakes are applied.

18.7 Overhaul master cylinder (dual)

Given two (2) dual master cylinders, and parts, the student will overhaul and/or replace the dual master cylinders according to manufacturers' specifications and without leakage.

BRAKE SERVICE (Cont.)

18.8 Reline drum-type brakes

Given two (2) vehicles equipped with different types of drum-type brakes, the student will remove and replace worn brake shoes or linings on each without pulling and with proper pedal height.

18.9 Cam grind brake shoes

Given two (2) sets of brake shoes, the student will cam grind brake shoe linings to fit drums according to manufacturers and OSHA specifications.

18.10 Inspect, measure and turn brake drums

Given four (4) brake drums (two front drums and two rear drums), the student will inspect drums for cracks, smoothness, taper, bell mouth, deep grooves, scoring, and out-of-round; then the student will gauge and machine until drum is smooth and within manufacturers' specifications.

18.11 Remove, replace, and overhaul wheel cylinders

Given four (4) wheel cylinders which will polish or hone with .002--.003 inch tolerance, the student will overhaul all four wheel cylinders according to manufacturers' specifications and replace without leakage.

18.12 Adjust drum brakes

Given four (4) vehicles from different manufacturers, the student will adjust brakes on in-service automobiles to the pedal height as specified by the manufacturer.

18.13 Reline disc-type brakes

Given three (3) vehicles from different manufacturers, the student will remove and replace worn disc brake linings without pulling or fading when completed.

18.14 Inspect, measure and reface disc brake rotors

Given four (4) rotors from two (2) different manufacturers, the student will inspect, measure and machine four disc brake rotors to specifications and according to lathe operating instructions.

BRAKE SERVICE (Cont.)

18.15 Remove, replace and overhaul calipers

Given four (4) calipers from two (2) different manufacturers, the student will overhaul brake calipers without leakage.

18.16 Recondition backing plates

Given one backing plate with worn or grooved shoe contact areas, the student will build the surface up by welding, machine and shape the surface to the original contour so the installed shoes will move freely.

19.0 TASK GROUP: STEERING

TASK GOAL: After completion of this module, the student will be able to diagnose and repair any steering problems encountered and the vehicle will not leak steering gear fluid, the steering wheel will not be off center, and there will be no slack in the steering gear.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

19.1 Diagnose steering problems

Given two (2) vehicles (one with manual steering and one with power steering), the student will diagnose and record steering problems and prescribe and perform needed repairs on each vehicle so the steering system operates properly.

19.2 Remove and replace power steering lines

Given two (2) vehicles with defective hydraulic lines and new lines, the student will remove and replace the power steering lines and the system will not leak after installation.

19.3 Remove and replace power steering pump

Given a vehicle equipped with power steering, the student will remove and replace the power steering pump, belt, power steering hose, and will fill reservoir to proper level. The unit will not leak or belt slip when completed.

19.4 Remove and replace manual steering gear assembly

Given a vehicle with manual steering, the student will remove and replace the manual steering gear obtaining proper adjustment.

19.5 Remove and replace power steering gear assembly

Given a vehicle equipped with power steering, the student will remove and replace the steering gear assembly so that it will turn fully in both directions and not leak.

19.6 Remove and replace steering wheel

Given a vehicle and puller, the student will remove and replace the steering wheel, aligning the steering wheel correctly and without damaging component parts.

STEERING (Cont.)

19.7 Remove and replace rod end, center link, and idler arm

Given a vehicle, the student will diagnose the degree of wear and remove and replace tie rod ends, center link, and idler arm.

19.8 Overhaul manual steering gear assembly

Given a vehicle with manual steering, the student will overhaul the manual steering gear, maintaining proper clearance and smooth operation, in accordance with manufacturers' specifications.

19.9 Overhaul power steering unit pump

Given two (2) vehicles with power steering, the student will overhaul the power steering unit, maintaining proper clearance and smooth operation without leakage.

19.10 Remove and replace power steering pump

Given a vehicle, the student will remove and replace the power steering pump, belt, hoses and fill to the proper level. The belt will not slip or fluid leak out.

19.11 Overhaul power steering pump

Given two (2) vehicles equipped with power steering, the student will overhaul the power steering pumps without vane noise or leaks.

19.12 Adjust worm and sector in steering box

Given two (2) different types of steering gear boxes, the student will adjust worm and sector to manufacturers' specifications.

19.15 Inspect and replace steering damper

Given three (3) types of steering dampers, the student will inspect, repair and replace, if necessary, the dampers to correct steering malfunctions.

20.0 TASK GROUP: SUSPENSION

TASK GOAL: After completion of this module, the student will be able to diagnose and repair suspension or alignment problems and the vehicle will not squeak, vibrate, sag, or pull from side to side while driving after being completed.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

20.1 Rotate tires

Given one (1) vehicle, the student will rotate the tires using manufacturer's recommendations.

20.2 Balance tires

Given four (4) vehicles, the student will balance the tires using the high speed balancer on two (2) and a bubble balancer on two (2) so that all tires will be balanced.

20.3 Lubricate front suspension

Given two (2) vehicles, the student will properly lubricate the front suspension and chassis without overlooking any grease fittings and following the vehicle manufacturers' recommendations.

20.4 Diagnose wear and alignment problems

Given four (4) vehicles, the student will inspect and diagnose the front suspension and determine and record what problems exist.

20.5 Remove, replace, clean, repack, and adjust front wheel bearings and seals

Given two (2) vehicles, one being disc brake, the student will remove four (4) wheel bearings, clean, inspect, and replace, as needed, worn bearings, repack, and adjust to factory specified tightness.

20.6 Align front end

Given three (3) vehicles, the student will check the tire pressure and align the front end of three cars with 100% accuracy according to manufacturers' specifications; the vehicle will not "drift" or "pull" in either direction.

SUSPENSION (Cont.)

20.7 Remove and replace shock absorbers

Given two (2) vehicles, the student will remove and replace front and rear shocks without rattles or looseness.

20.8 Remove and replace coil springs

Given a vehicle, the student will remove and replace front and rear coil springs to restore vehicle to specified height.

20.9 Remove and replace and adjust torsion bar

Given a vehicle equipped with torsion bar suspensions, the student will remove and replace and adjust torsion bars on the automobile so that after torsion bars are installed, the vehicle will be level from side to side.

20.10 Remove and replace leaf springs and spring shackles

Given a vehicle equipped with leaf springs, the student will remove and replace leaf springs, spring shackles and bushings so that after component parts are installed, the vehicle will be level and will track properly without noise or squeaks.

20.11 Remove and replace upper and lower control arms

Given a vehicle, the student will remove and replace upper and lower control arms and replace shaft bushings without damage to component parts.

20.12 Remove and replace ball joints

Given two (2) vehicles equipped with riveted or bolted ball joints, the student will remove and replace upper and lower ball joints, one with upper spring and one with lower spring; the vehicles will be level from side to side and not make noise when front end is pushed up and down.

20.13 Remove and replace stabilizers, sway bar, strut bar, and bushings

Given a vehicle, the student will remove and replace stabalizers, sway bar, strut bar, and bushings; the vehicle will not squeak or have bumping noise when front end is pushed up and down.

SUSPENSION (Cont.)

20.14 Remove and replace king pins

Given a vehicle equipped with king pin suspension, the student will remove and replace one set of floating king pin bushing and ream one set of king pin bushings in accordance with manufacturers' specifications.

20.15 Inspect tires and wheels

Given one vehicle, the student will inspect tires and wheels for hazardous conditions and serviceability.

21.0 TASK GROUP: CARBURETOR

TASK GOAL: After completion of this module, the student will be able to diagnose and repair carburetor problems to meet manufacturers' and EPA specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

21.1 Test and repair heated air intake system

Given two (2) vehicles (one with vacuum control unit and one with capsule of mechanical control sensory device) and engine analyzer or vacuum gauge, the student will test and repair heated carburetor air systems in accordance with manufacturers' specifications.

21.2 Test and replace the manifold heat control valve

Given two (2) vehicles and necessary parts, the student will check and replace the heat control valve so that it operates without leakage.

21.3 Check and replace the temperature sensor

Given two (2) vehicles and temperature gauge, the student will check or replace the temperature sensors so that they work properly.

21.4 Test and repair automatic choke

Given two (2) types of automatic chokes (one piston type, one diaphragm type) for each vehicle type, the student will test and repair automatic choke to manufacturers' specifications.

21.5 Remove, replace, and overhaul carburetor

Given three (3) vehicles (one single barrel, one two barrel, and one four barrel carburetor) and parts, the student will remove, overhaul, adjust, replace carburetor without leaks, and achieve proper performance and emission standards.

21.6 Test, repair, and adjust carburetor controls

Given three (3) vehicles (one single barrel, one two barrel, and one four barrel carburetor) and testing equipment, the student will make all the necessary adjustments and calibrations as set forth by EPA standards.

CARBURETOR (Cont.)

21.7 Adjust air screws on carburetor and idle RPM

Given one (1) vehicle (two barrel or four barrel carburetor), the student will adjust the air screws and idle RPM to manufacturers' specifications.

21.8 Test and replace the hot idle compensator valve

Given two (2) vehicles, vacuum gauge, and analyzer, the student will be able to test and replace hot idle compensator valve; the linkage will not stick and vehicle will idle according to EPA standards.

21.9 Test carbon monoxide and hydrocarbons with infra-red analyzer

Given three (3) engines, the student will use an infra-red analyzer to measure CO and HC at idle and high speed and satisfactorily report to the instructor the mechanical condition of the engine, and the condition of the carburetor and ignition system.

21.10 Adjust carburetor idle mixture with tachometer

Given three (3) engines, the student will adjust the idle mixture according to the manufacturers' procedure and the engine will idle smoothly and at the specified idle speed.

21.11 Adjust carburetor idle mixture (CO) with infra-red analyzer

Given three (3) engines and the manufacturers' CO value at idle, the student will adjust the carburetor idle mixture screws according to manufacturers' procedure, meet the CO specifications and the engine will idle and run satisfactorily.

22.0 TASK GROUP: IGNITION

TASK GOAL: After completion of this module, the student will be able to diagnose and repair ignition problems to meet manufacturers' and EPA standards

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

22.1 Test engine on oscilloscope and accurately report reading of test patterns

Given a domestic automobile and an oscilloscope, the student will be able to connect leads, operate scope, analyze scope patterns, and correctly report malfunctions in the engines' performance.

22.2 Test and repair or replace the ignition primary circuit including points, condensor, coil wiring, and ignition switch

Given a domestic automobile, the student will be able to accurately test and replace or repair any part of the primary ignition circuit, including setting dwell to the satisfaction of the instructor.

22.3 Test and recondition or replace the parts of the secondary circuit of the ignition system

Given a domestic automobile, the student will be able to accurately test the secondary cricuit of the ignition system and replace any defective parts; the secondary circuit will be in correct operation when completed.

22.4 Remove and replace distributor

Given three (3) vehicles from different manufacturers, the student will remove and replace an ignition distributor so that the distributor is timed in such a manner that the vehicle will start.

22.5 Overhaul distributor

Given one (1) distributor and parts, the student will disassemble, overhaul, and reassemble distributor to meet manufacturers' specifications.

IGNITION (Cont.)

22.6 Test, repair, and adjust distributor controls

Given three (3) different types of distributors from different manufacturers, the student will be able to test, repair, and adjust the distributor advances to 90% accuracy on any domestic auto.

22.7 Test and/or replace automatic spark advance

Given three (3) different vehicles from different manufacturers, the student will test the automatic spark advance system and replace components as necessary; the vehicle spark advance mechanism will perform to manufacturers' specifications when completed.

22.8 Clean. gap, test spark plugs

Given a set of 6 or 8 spark plugs, the student will clean, gap, and test spark plugs to instructors satisfaction.

22.9 Measure resistance in plug wires

Given a set of 6 or 8 plug wires, the student will measure resistance with an ohmmeter to determine excessive resistance according to manufacturers specifications.

22.10 Locate and repair shorts and opens

Given a vehicle and proper equipment, the student will locate and repair shorts and opens.

23.0 TASK GROUP: EMISSION CONTROLS

TASK GOAL: After completion of this module, the student will repair, replace, or adjust emission control components on a vehicle to comply with specifications on emission levels accepted by government agencies.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

23.1 Check PCV valve system

Given three (3) vehicles, the student will be able to diagnose and repair or replace defective PCV valve systems on domestic autos to maintain negative crankcase pressure at idle speed.

23.2 Test and repair the air injection reaction type system

Given a vehicle with air-type system, the student will be able to diagnose and repair an air injection system on any domestic auto to meet prescribed emission levels.

23.3 Test and repair exhaust gas recirculation systems

Given two (2) vehicles, the student will test, repair, or replace the exhaust gas recirculation system on any domestic auto according to manufacturers' procedures.

23.4 Test and repair ignition spark control exhaust emission systems

Given two (2) vehicles, the student will test and if necessary, repair the vacuum advance/retard system on any auto according to the manufacturers' procedure.

24.0 TASK GROUP: FUEL SYSTEM

TASK GOAL: After completion of this module, the student will be able to diagnose and repair fuel system problems to meet manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

24.1 Check and/or replace fuel and air filters

Given a vehicle, the student will check and/or replace the fuel and air filters properly and without leaks.

24.2 Test and replace fuel lines and hoses

Given two (2) vehicles and parts, the student will test and replace fuel lines so there is no leakage.

24.3 Test and replace fuel pump

Given three (3) vehicles, the student will test fuel pump for leaks, pressure, and volume and replace pump (if needed) without any leaks or damage.

24.4 Test and repair evaporative emission control systems

Given a vehicle, the student will test, repair, or replace the evaporative emission control system according to manufacturers' specifications on all domestic automobiles.

25.0 TASK GROUP: FUEL INJECTION

TASK GOAL: After completion of this module, the student will be able to diagnose and repair fuel injection problems to meet manufacturers' specifications.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

25.1 Analyze problems by electrical diagnostic equipment

Given a fuel injection equipped vehicle, the student will be able to check with a volt-ohm meter, all sensors and control unit according to manufacturers' procedures.

25.2 Repair or replace electrical fuel injection computer

Given a fuel injection equipped vehicle, the student will be able to locate, remove and replace fuel injection computer to the satisfaction of the instructor.

25.3 Repair or replace fuel injectors

Given a fuel injection equipped vehicle, the student will be able to diagnose faulty injectors and replace as necessary according to manufacturers' specifications.

25.4 Remove and/or replace fuel injector pumps

Given a fuel injected vehicle, the student will be able to diagnose faulty injector pumps, remove and/or replace as necessary according to manufacturers' specifications.

25.5 Repair or replace wiring harness

Given a fuel injected vehicle with wiring problems (shorts, grounds, opens) the student will isolate the problem and repair.

26.0 TASK GROUP: EVALUATING AND INSPECTING

TASK GOAL: After completion of this module, the student will be able to inspect and evaluate the safety condition of a vehicle and estimate repair costs.

Given safety procedures, service manuals, manufacturers' specifications, proper tools and equipment, the student will obtain the following competencies:

TASK NUMBER:

26.1 Analyze cause of vehicle failures

Given a vehicle and procedures, the student will analyze causes of vehicle failure.

26.2 Conduct spot checks on malfunctions

Given a vehicle and procedures, the student will conduct a spot check on malfunctions.

26.3 Estimate cost of vehicle repair

Given a parts and flat rate manual, the student will be able to estimate cost of vehicle repairs.

26.4 Inspect and test windshield wiper motors, blocks and arms

Given a vehicle, a student will inspect and test windshield wiper motors, blocks and arms.

26.5 Perform inspection of vehicle condition

Given a vehicle and check list, the student will perform inspection of vehicle condition and determine safety and condition of the vehicle.

AUTOMOTIVE MECHANICS CHECKLIST OF TASKS

Student Name_____

Instructor_____ School_____ Date Attended_____

Task No.	Task or Job	Date/Instructor Initial				
1.0	*ACCESSORIES-AIR CONDITIONING*					
1.1	Connect manifold guage to system					
1.2	Purge R-12 to atmosphere					
1.3	Evacuate refrigeration system					
1.4	Charge system using "pound" cans					
1.5	Charge system using a bulk source					
1.6	Perform leak test with halide torch					
1.7	Perform leak test with electronic tester					
1.8	Repair or replace refrigerant lines					
1.9	Purge system					
1.10	Remove and replace clutch and hub assembly					
1.11	Remove and replace compressor gas shaft seal					
1.12	Remove and replace compressor valve plates					
1.13	Remove and replace compressors					
1.14	Remove and replace thermostatic expansion valve					
1.15	Remove and replace EPR (evaporative pressure absolute) valve					
1.16	Remove and replace POA (pilot-operated absolute) valve					
1.17	Remove and replace condenser					
1.18	Performance-test system for temperatures					
1.19	Diagnose refrigerant problems					
1.20	Add oil under pressure					

AUTOMOTIVE MECHANICS CHECKLIST OF TASKS

Student Name_____

Instructor_____ School_____ Date Attended_____

Task No.	Task or Job	Date/Instructor Initial				
1.21	Overhaul compressor					
1.22	Repair automatic air and heater vacuum and electrical circuits					
1.23	Remove and replace fan motor					
1.24	Remove and replace dryer					
1.25	Service control cables and switches					
1.26	Identify pneumatic components and connections from schematics					
1.27	Adjust compressor belt tension					
1.28	Test vacuum components					
1.29	Test mechanical-pneumatic controls					
1.30	Test thermo-pneumatic controls					
1.31	Remove and replace or repair pneumatic components					
2.0	*ACCESSORIES HEATERS*					
2.1	Diagnose heating system malfunctions					
2.2	Inspect, remove and replace defrost ducts					
2.3	Inspect and replace control cables and switches					
2.4	Inspect and replace heater hoses					
2.5	Remove and replace heater control valve					
2.6	Remove and replace heater core					

AUTOMOTIVE MECHANICS CHECKLIST OF TASKS

Student Name_____

Instructor_____ School_____ Date Attended_____

_____ _____ _____

Task No.	Task or Job	Date/Instructor Initial				
3.0	*CHASSIS, ELECTRICAL COMPONENT SERVICE*					
3.1	Find schematic diagram for vehicles					
3.2	Identify wire gauge and color code identification					
3.3	Splice wires and connect terminals, solderless/solder					
3.4	Isolate opens, grounds and shorts					
3.5	Test, remove, and replace switches, circuit breakers and fuses					
3.6	Perform operational inspection-lighting systems					
3.7	Test, remove, and replace lights, sockets and connections					
3.8	Identify defective flasher units and replace					
3.9	Test and repair turn-signal unit					
3.10	Adjust headlights					
3.11	Adjust, repair or replace back-up light switch					
3.12	Test and repair horn circuit					
3.13	Test and identify faulty instrument gauges and warning lamps					
3.14	Remove and replace gauge and sending units (fuel, temperature, oil etc.)					
3.15	Replace chassis wiring					
3.16	Repair windshield wiper mechanisms or controls					
3.17	Test blower motor for open and grounds					
3.18	Test, remove and replace cruise control units					
3.19	Test wiper blades and arms					
3.20	Analyze cause of vehicle electrical fires					

AUTOMOTIVE MECHANICS CHECKLIST OF TASKS

Student Name_____

Instructor_____ School_____ Date Attended_____

_____ _____ _____

Task No.	Task or Job	Date/Instructor Initial				
3.21	Test, remove and replace stop light switch					
3.22	Test, repair automatic alarm systems of safety items (key, seat belts, etc.)					
4.0	*STARTING SYSTEM*					
4.1	Test starting system					
4.2	Remove and replace solenoid					
4.3	Remove and replace starter motor					
4.4	Overhaul starter					
4.5	Remove and replace ignition switch					
5.0	*CHARGING SYSTEM*					
5.1	Remove and replace alternator belt					
5.2	Test alternator output					
5.3	Test voltage regulator					
5.4	Remove and replace alternator					
5.5	Remove and replace voltage regulator					
5.6	Overhaul alternator					
5.7	Test d.c. generator output					
5.8	Overhaul d.c. generator					

AUTOMOTIVE MECHANICS CHECKLIST OF TASKS

Student Name_____

Instructor_____ School_____ Date Attended_____

_____ _____ _____

Task No.	Task or Job	Date/Instructor Initial				
6.0	*BATTERY*					
6.1	Clean battery and cable connections					
6.2	Check electrolyte level					
6.3	Perform hydrometer test					
6.4	Perform capacity (load) test					
6.5	Perform charge test (3 minute charge)					
6.6	Perform cell probe test					
6.7	Charge batteries					
6.8	Service or replace battery box and hold down					
7.0	*ENGINE SERVICE-COOLING SYSTEM*					
7.1	Check liquid coolant level & restore amount					
7.2	Check and replace all drive belts, coolant hoses, pulleys, & overflow tank					
7.3	Check baffles & fins for restriction					
7.4	Check exhaust leakage in cooling system					
7.5	Remove & replace radiator & shroud					
7.6	Check & replace thermostat and housing.					
7.7	Check & replace water pump					
7.8	Check & replace core plugs (freeze plugs)					
7.9	Check coolant freezing point					
7.10	Check coolant temperature					

AUTOMOTIVE MECHANICS CHECKLIST OF TASKS

Student Name_____

Instructor_____ School_____ Date Attended_____

Task No.	Task or Job	Date/Instructor Initial				
7.11	Check and replace fan					
7.12	Inspect and replace radiator hoses					
7.13	Replace fan clutch					
7.14	Test & replace coolant pressure cap					
7.15	Test thermostat operation					
7.16	Pressure test cooling system					
8.0	*ENGINE SERVICE-ENGINE TESTS*					
8.1	Make wet & dry compression test					
8.2	Diagnose coolant loss					
8.3	Diagnose overheating problem					
8.4	Diagnose fluid leaks					
8.5	Diagnose vacuum leaks					
8.6	Use cylinder leakage tester					
8.7	Diagnose mechanical engine noise					
8.8	Diagnose exhaust leaks					
8.9	Perform cylinder balance test					
9.0	*EXHAUST SYSTEM*					
9.1	Remove & replace or repair heat riser					
9.2	Remove & replace exhaust manifold					

AUTOMOTIVE MECHANICS CHECKLIST OF TASKS

Student Name_____

Instructor_____ School_____ Date Attended_____

Task No.	Task or Job	Date/Instructor Initial				
9.3	Remove & replace mufflers, resonators, exhaust pipes, and extensions					
9.4	Inspect for exhaust leaks					
9.5	Check for exhaust restrictions					
10.0	*MAJOR SERVICE*					
10.1	Remove & replace engine					
10.2	Remove cylinder ridge					
10.3	Remove & replace rods & pistons					
10.4	Disassemble, inspect & reassemble piston/rod					
10.5	Measure & service piston assembly					
10.6	Remove, service & replace crankshaft and bearings					
10.7	Remove & replace rear main oil seal					
10.8	Measure cylinder bore					
10.9	De-glaze cylinder					
10.10	Remove & replace camshaft & lifters					
10.11	Remove and replace camshaft bearings					
10.12	Bore cylinder oversize					
10.13	Inspect head for warp					
10.14	Inspect block for warp					
10.15	Measure crankshaft & camshaft journal size using micrometers					
10.16	Remove & replace flywheel					

AUTOMOTIVE MECHANICS CHECKLIST OF TASKS

Student Name_____

Instructor_____ School_____ Date Attended_____

Task No.	Task or Job	Date/Instructor Initial				
10.17	Remove & replace flywheel ring gears					
10.18	Replace gaskets and seals					
10.19	Remove & replace oil pan					
10.20	Remove & replace timing gears					
10.21	Remove & replace timing sprockets & chain					
10.22	Clean engine parts & check for condition					
10.23	Measure rod to crank cheek clearance					
10.24	Measure crank cheek to main thrust bearing clearance					
10.25	Pressure test block for leaks					
11.0	*MINOR SERVICE*					
11.1	Remove & replace motor mounts					
11.2	Change oil & filter					
11.3	Remove & replace valve cover gaskets					
11.4	Adjust valves					
11.5	Remove & replace intake manifold					
11.6	Remove & replace timing gear cover & harmonic balancer					
11.7	Remove & replace valve stem seals (with cylinder head installed)					
11.8	Remove & replace oil pump					
11.9	Perform operational inspection of lubricating system					
11.10	Inspect rear main oil seal for leaks					

AUTOMOTIVE MECHANICS CHECKLIST OF TASKS

Student Name_____

Instructor_____ School_____ Date Attended_____

_____ _____ _____

Task No.	Task or Job	Date/Instructor Initial				
12.0	*VALVE TRAIN*					
12.1	Remove & replace cylinder heads (gasket)					
12.2	Check & assemble cylinder heads					
12.3	Reface valves & stem					
12.4	Resurface valve seats					
12.5	Check valve springs (tension & square)					
12.6	Machine guides for special seals					
12.7	Test, remove and replace cam followers					
12.8	Check cylinder head for cracks					
12.9	Determine valve guide to valve stem clearance					
12.10	Recondition valve guides					
13.0	*POWER TRAIN-AUTOMATIC TRANSMISSION*					
13.1	Check & add fluid to proper level					
13.2	Change fluid and filter					
13.3	Adjust throttle linkage					
13.4	Adjust column or floor shift linkage					
13.5	Adjust neutral safety switch					
13.6	Adjust electrical kick-down switch					
13.7	Remove & replace & check vacuum modulator					
13.8	Remove & replace transmission or engine mounts					

AUTOMOTIVE MECHANICS CHECKLIST OF TASKS

Student Name _____

Instructor _____ School _____ Date Attended _____

Task No.	Task or Job	Date/Instructor Initial				
13.9	Adjust bands					
13.10	Stall & oil pressure test transmission					
13.11	Diagnose cooler problems					
13.12	Clean cooler system					
13.13	Repair minor leaks					
13.14	Install auxiliary coolers					
13.15	Remove & replace transmission					
13.16	Remove & replace housing, bushing & seal					
13.17	Remove & replace front pump seal & bushing					
13.18	Assemble & disassemble transmission by units					
13.19	Remove & replace bushings					
13.20	Diagnose planetary gear assembly					
13.21	Overhaul clutch assembly					
13.22	Diagnose and repair governor					
13.23	Diagnose & clean valve body					
13.24	Diagnose & remove & replace overrunning sprag					
13.25	Check converter removed from car					
14.0	*CLUTCH*					
14.1	Adjust clutch pedal linkage					
14.2	Road test & noise diagnoses					

AUTOMOTIVE MECHANICS CHECKLIST OF TASKS

Student Name_____

Instructor_____ School_____ Date Attended_____

_____ _____ _____

Task No.	Task or Job	Date/Instructor Initial				
14.3	Replace clutch assembly and/or release bearing & fork					
14.4	Replace pilot bearing					
14.5	Check flywheel & housing runout and flatness					
14.6	Inspection of parts					
14.7	Repair hydraulic type clutch					
15.0	*DRIVE LINE*					
15.1	Road test & diagnose drive line noise & vibrations					
15.2	Remove & replace driveshaft assembly					
15.3	Overhaul drive line assembly					
15.4	Check drive line and pinion angle					
15.5	Lubricate and service universal joints					
15.6	Replace universal joints					
15.7	Check drive line end-play and run-out					
16.0	*FINAL DRIVE*					
16.1	Road test & diagnose final drive noise					
16.2	Remove & replace rear axle					
16.3	Remove & replace pinion seals					
16.4	Inspect for proper lubricant type and level					
16.5	Remove & replace final drive assembly					

AUTOMOTIVE MECHANICS CHECKLIST OF TASKS

Student Name_____

Instructor_____ School_____ Date Attended_____

_____ _____ _____

Task No.	Task or Job	Date/Instructor Initial				
16.6	Overhaul carrier assembly					
16.7	Inspect & repair 4 wheel drive locking hubs					
16.8	Inspect 4 wheel drive mechanisms					
16.9	Replace rear axle bearings & seal					
17.0	*STANDARD TRANSMISSION*					
17.1	Inspect for proper lubricant type and level					
17.2	Adjust shift linkage					
17.3	Remove & replace transmission mounts					
17.4	Road test car for noise diagnoses					
17.5	Remove & replace extension housing seal and bushing					
17.6	Remove & replace transmission					
17.7	Overhaul 3 speed standard transmission					
17.8	Inspection of internal parts					
17.9	Remove & replace speedometer drive gear					
17.10	Remove & replace input and output shaft bearings					
18.0	*BRAKE SERVICE					
18.1	Diagnose brake system					
18.2	Remove & replace brake lines & hose					
18.3	Bleed hydraulic systems					

AUTOMOTIVE MECHANICS CHECKLIST OF TASKS

Student Name _____

Instructor _____ School _____ Date Attended _____

Task No.	Task or Job	Date/Instructor Initial				
18.4	Adjust parking brake					
18.5	Remove & replace power brake booster					
18.6	Remove & replace proportioning/metering valve					
18.7	Overhaul master cylinder (dual)					
18.8	Reline drum type brakes					
18.9	Cam grind brake shoes					
18.10	Inspect, measure & turn brake drums					
18.11	Remove, replace & overhaul wheel cylinders					
18.12	Adjust drum brakes					
18.13	Reline disc-type brakes					
18.14	Inspect, measure and reface disc brake rotors					
18.15	Remove, replace & overhaul calipers					
18.16	Recondition backing plates					
19.0	*STEERING*					
19.1	Diagnose steering problems					
19.2	Remove & replace power steering lines					
19.3	Remove & replace power steering pump					
19.4	Remove & replace manual steering gear assembly					
19.5	Remove & replace power steering gear assembly					
19.6	Remove & replace steering wheel					

AUTOMOTIVE MECHANICS CHECKLIST OF TASKS

Student Name_____

Instructor_____ School_____ Date Attended_____

_____ _____ _____

Task No.	Task or Job	Date/Instructor Initial				
19.7	Remove & replace rod end, center link, and idler arm					
19.8	Overhaul manual steering gear assembly					
19.9	Overhaul power steering unit					
19.10	Remove and replace power steering pump					
19.11	Overhaul power steering pump					
19.12	Adjust worm and sector in steering box					
19.13	Lubricate steering box and linkage					
19.14	Rebuild power steering cylinder					
19.15	Inspect & replace steering damper					
19.16	Overhaul Rack & Pinion Power Steering unit					
19.17	Replace or overhaul McPherson Struts					
	SUSPENSION					
20.1	Rotate tires					
20.2	Balance tires					
20.3	Lubricate front suspension					
20.4	Diagnose wear & alignment problems					
20.5	Remove, replace, clean, repack, & adjust front wheel bearings and seals					
20.6	Align front end					
20.7	Remove & replace shock absorbers					
20.8	Remove & replace coil springs					

AUTOMOTIVE MECHANICS CHECKLIST OF TASKS

Student Name_____

Instructor_____ School_____ Date Attended _____

Task No.	Task or Job	Date/Instructor Initial				
20.9	Remove & replace torsion bar					
20.10	Remove & replace leaf spring shackles					
20.11	Remove & replace upper & lower control arms					
20.12	Remove & replace ball joints					
20.13	Remove & replace stabilizers, sway bar, strut bar, and bushings					
20.14	Remove & replace king pins					
20.15	Inspect tires and wheels					
21.0	*TUNE-UP - CARBURETION*					
21.1	Test & repair heated air intake systems					
21.2	Test & replace manifold heat control valve					
21.3	Check & replace temperature sensor					
21.4	Test & repair automatic choke					
21.5	Remove, replace & overhaul carburetor					
21.6	Test, repair, & adjust carburetor controls					
21.7	Adjust air screws on carburetor & idle RPM					
21.8	Test & replace the hot idle compensator valve					
21.9	Test carbon monoxide and hydrocarbons with infra-red analyzer					
21.10	Adjust carburetor idle mixture with tachometer					
21.11	Adjust carburetor idle mixture (CO) with infra-red analyzer					

AUTOMOTIVE MECHANICS CHECKLIST OF TASKS

Student Name_____

Instructor_____ School_____ Date Attended_____

Task No.	Task or Job	Date/Instructor Initial				
22.0	*IGNITION*					
22.1	Test engine on scope & accurately report reading of test patterns					
22.2	Test & repair/replace ignition primary circuit including points, condensor, coil, wiring, and ign. switch					
.3	Test & recondition or replace the parts of the secondary circuit of the ignition system					
4	Remove & replace distributor					
5	Overhaul distributor					
.6	Test, repair, adjust distributor control					
22.7	Test and/or replace automatic spark advance					
22.8	Clean, gap, test spark plugs					
22.9	Measure resistance in plug wires					
22.10	Locate & repair shorts and opens					
23.0	*EMISSION CONTROLS*					
23.1	Check PCV valve system					
23.2	Test & repair the air injection reactor type system					
23.3	Test & repair exhaust gas recirculation systems					
23.4	Test & repair ignition spark control exhaust emission systems					
24.0	*FUEL SYSTEM*					
24.1	Check and/or replace fuel air filters					
24.2	Test & replace fuel lines and hoses					

AUTOMOTIVE MECHANICS CHECKLIST OF TASKS

Student Name: _____

Instructor_____ School_____ Date Attended_____

_____ _____ _____

Task No.	Task or Job	Date/Instructor Initial				
24.3	Test & replace fuel pump					
24.4	Test & repair evaporative emission control systems					
24.5	Check for moisture & foreign particles					
24.6	Inspect and service gas tank and cap					
25.0	*FUEL INJECTION*					
25.1	Analyze problems by electrical diagnostic equipment					
25.2	Repair or replace electrical fuel injection computer					
25.3	Repair or replace fuel injectors					
25.4	Repair or replace fuel injector pumps					
25.5	Repair or replace wiring harness					
26.0	*EVALUATING AND INSPECTING*					
26.1	Analyze causes of vehicle failures					
26.2	Conduct spot checks on malfunctions					
26.3	Estimate cost of vehicle repairs					
26.4	Inspect & test windshield wiper motors, blades & arms					
26.5	Perform inspection of vehicle condition					
26.6	Identification & usage of basic hand tools					
26.7	Shop safety					

APPENDIX A

PROJECT APPROACH

The project was started in March 1977 and concluded in June 1978. The development of a continuum of automotive mechanics instruction was viewed as the development of a list of tasks to be taught and the accomplishment of these tasks at different levels and in different programs of automotive mechanics. This instruction can be found as industrial arts, trades and industry, and technical education automotive mechanics at the secondary and post-secondary level.

An effort on automotives articulation was located and this project utilized a similar organization of tasks and format. This effort can be found as Automotive Mechanics Program Articulation, Dallas and Tarrant Counties, John Owens, Project Director and Designer, Dallas County Community College District, 701 Elm Street, Dallas, Texas 75202.

Automotive and power mechanics teachers from the industrial arts, trades and industry, and community college programs were selected from throughout the State with the assistance of county and local school district coordinators. These teachers gathered at Arizona State University during three sessions to devise, review, revise, and finalize the materials included in this report.

Automotive mechanics tasks were identified and revised by the participants at the first workshop. These tasks were distributed Statewide to power and automotive mechanics instructors identified as either industrial arts, trades and industry, or community college. The questionnaire sought further input on the addition or deletion of tasks appropriate to the instructors' program and level of instruction.

The participants met a second time and revised the original list of tasks based upon the returns and determined whether the accomplishment of the tasks were appropriate at the industrial arts, trades and industry, or community college type of program. The objectives developed by Dallas and Tarrant Counties' study were used as the basis for writing separate objectives for each type of automotive mechanic programs.

At the last workshop session the participants reviewed the levels at which the tasks would be presented and completed writing objectives for the tasks. Course outlines, curriculum guides, and job sheets were also reviewed for possible inclusion in the final report but were not included.

APPENDIX B

SOURCES OF INSTRUCTIONAL GUIDES

Automechanics I, Teacher Material. State Department of Vocational Technical Education, Curriculum and Instructional Materials Center, 1515 W. 6th Avenue, Stillwater, Oklahoma 74074. Teacher material - $15.00, student material-$8.50. Automechanics II under development.

Auto Emission Control - Teacher. Mid-America Vocational Curriculum Consortium, Inc., 1515 W. 6th Avenue, Stillwater, Oklahoma 74074. Teacher manual - $4.00, student-$2.00. Other teacher manuals available:

Comprehensive SmallEngine Repair - $6.00
Diesel Engine Mechanic Repair - $11.00
Motorcycle Repair - $5.25

Curriculum Guide For Industrial Arts Education, Energy and Power, IA-3-I. Instructional Materials Lab, University of Missouri-Columbia, 10 Industrial Education Building, Columbia, Missouri 65201. Cost-$10.00

Instructor's Guide For Vehicle Emissions Control Training, 1167-3, cost-$4.25. Transparency Masters for use with Instructor's Guide for Vehicle Emissions Control, 1167-4, cost-$2.25. Student's Workbook for Vehicle Emissions Control Training, 1167-5, cost-$2.25. Colorado State University, Department of Industrial Sciences, Fort Collins, Colorado 80523.